UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY





LITHOLOGIC AND GEOPHYSICAL LOGS AND COAL ANALYSES FROM TEST HOLES

DRILLED DURING 1977 IN CONVERSE AND CAMPBELL COUNTIES, WYOMING

Ву

Frank B. Kistner, Gregg A. Hollomon, and David G. Coppock

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This report has not been edited for conformity with U.S. Geological Survey editorial standards or stratigraphic nomenclature.

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CONVERSTION TABLE

To convert ENGLISH UNITS	Multiply by	To obtain METRIC UNITS
Inches	2.54	Centimeters
Feet	0.3048	Meters
Btu/1b	2.324	Joule/kilogram
Fahrenheit	-32 and \div by 1.8	Celsius

LIST OF ABBREVIATIONS

amts - amounts

grnd - grained

appx - approximate

gry - gray

avg - average

L.S. - land surface

blk - black

lt - light

brn - brown

L.T.D. - logged total depth

brnish - brownish

m - medium

carb - carbonaceous

or - orange

conch - conchoidal

pos - possible

dk - dark

prtcls - particles

f - fine

sdy - sandy

frac - fracture

sh - shale

frag - fragment

sltst - siltstone

fragal - fragmental

ss - sandstone

G.L. - ground level

v - very

vf - very fine

vit - vitreous

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INTRODUCTION

Between August 11 and November 16, 1977, 28 coal test holes were drilled in Converse and Campbell Counties, Wyo. (fig. 1). This drilling was done as part of an ongoing U.S. Geological Survey (USGS) program to evaluate and classify mineral lands in the public domain. The overall purpose of the program is to gather data on the thickness, quality, extent, correlation, and recoverability of coal beds, and the thickness and lithologic characteristics of the associated rocks in the Tertiary Fort Union and Wasatch Formations of the Powder River Basin.

This report presents geophysical logs and lithologic descriptions, lagged or corrected in depth intervals to match the geophysical logs of each test hole, and analyses of coal samples obtained from three offset core holes. Similar information from 343 test holes and approximately 149 coal samples from 53 core tests in Campbell and Converse Counties, Wyo., was presented in earlier reports (U.S. Geological Survey and Montana Bureau of Mines and Geology, 1973, 1974, 1976a, 1976b, 1977, 1978; Kistner, 1977). Figure 1 shows the locations and test-hole numbers of all holes drilled during the 1977 field season.

Specific locations, following the system of land survey used by the U.S. Bureau of Land Management, appear on the individual log headings. The locations are indicated as distances, in feet, scaled from section lines as they appear on topographic quadrangle sheets. Elevations are approximate for all test holes except CD-77001 which was surveyed. Upon completion of drilling, test-hole CD-77001 was cased and converted to a water-observation well.

A conventional rotary drill was used with circulating water as the usual drilling fluid. Continuous 10-foot samples were collected except where circulation was difficult to maintain and then an air-mist drilling medium was used and no samples were collected. Samples were logged by a geologist in the field and then bagged and sent to the USGS storage facilities in Casper, Wyo. Field logs were completed for each test hole, and are also on file in Casper.

The geophysical logging procedure was to run the gamma ray probe followed by the resistance-spontaneous potential (SP) probe, unless there were problems with drill-hole stability. In these instances, the drill pipe was used to temporarily case the hole, and the gamma ray log was run through the drill pipe. Contract loggers geophysically logged the following test holes: CD-77018, CD-77024, CD-77027, and CD-77028. The logs were photographically reduced to 1 inch to 50 feet for convenience in reproducing this report and the originals are on file at the Casper office.

Eight core samples (table 1) were obtained from the following coal test holes: CD-77006, CD-77008, and CD-77017. A core hole was drilled adjacent to a logged test hole to obtain a sample of the coal interval (or intervals) indicated on the logs of the test hole. The core was measured, described, packaged, and sent for analysis to the USGS laboratory, Lakewood, Colo. The results of the analyses for these core samples are presented in tables 2-5 of this report. Analytical procedures used by the Survey are described in Swanson and Huffman (1976).

Discretion is urged in the use and interpretation of the coal analysis data. Although great care was exercised in obtaining and preserving the coal cores, changes in moisture content and some contamination from the drilling-fluid additives should be anticipated. Each core sample is approximately 2-1/8 in. in diameter and as much as 14.7 ft in length and the analysis of a sample this small may not be typical of the coal beds in the surrounding area.

ACKNOWLEDGMENTS

Fieldwork was carried out by the following USGS personnel: Frank B.

Kistner, Linda G. Riglin, Edmund L. Fivas, geologists; Gregg A. Hollomon,

technician; and Harry R. Cureton, driller. Lithologic detail was added to

the field descriptions by Gregg A. Hollomon and David G. Coppock. Supervision

and technical guidance were provided by Frank B. Kistner and Elmer M. Schell.

Joseph R. Hatch, geologist, coordinated and compiled the various coal analyses.

REFERENCES

- Kistner, F. B., 1977, Preliminary report of coal drill-hole data in the southern Powder River Basin, Converse County, Wyoming: U.S. Geological Survey Open-File Report 77-774, 25 p.
- Swanson, V. E., and Huffman, Claude, Jr., 1976, Guidelines for sample collecting and analytical methods used in the U.S. Geological Survey for determining chemical composition of coal: U.S. Geological Survey Circular 735, 11 p.
- U.S. Geological Survey and Montana Bureau of Mines and Geology, 1973, Preliminary report of coal drill-hole data and chemical analyses of coal beds in Sheridan and Campbell Counties, Wyoming; and Big Horn County, Montana: U.S. Geological Survey open-file report, 57 p.
- 1974, Preliminary report of coal drill-hole data and chemical analyses of coal beds in Campbell County, Wyoming: U.S. Geological Survey Open-File Report 74-97, 241 p., 1 fig., 3 tables.
- of coal beds in Campbell and Sheridan Counties, Wyoming; Custer, Prairie, and Garfield Counties, Montana; and Mercer County, North Dakota: U.S. Geological Survey Open-File Report 76-319, 377 p., 4 figs., 3 tables.
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- U.S. Geological Survey and Montana Bureau of Mines and Geology, 1977, Preliminary report of 1976 drilling of coals in Campbell and Sheridan Counties, Wyoming; and Big Horn, Dawson, McCone, Richland, Roosevelt, Rosebud, Sheridan, and Wibaux Counties, Montana: U.S. Geological Survey Open-File Report 77-283, 403 p., 6 figs.
- 1978, Geophysical logs for Campbell and Converse Counties, Wyoming, chapter E of Preliminary report of 1977 coal drilling in eastern Montana and northeastern Wyoming: U.S. Geological Survey Open-File Report 77-721-E, 202 p.

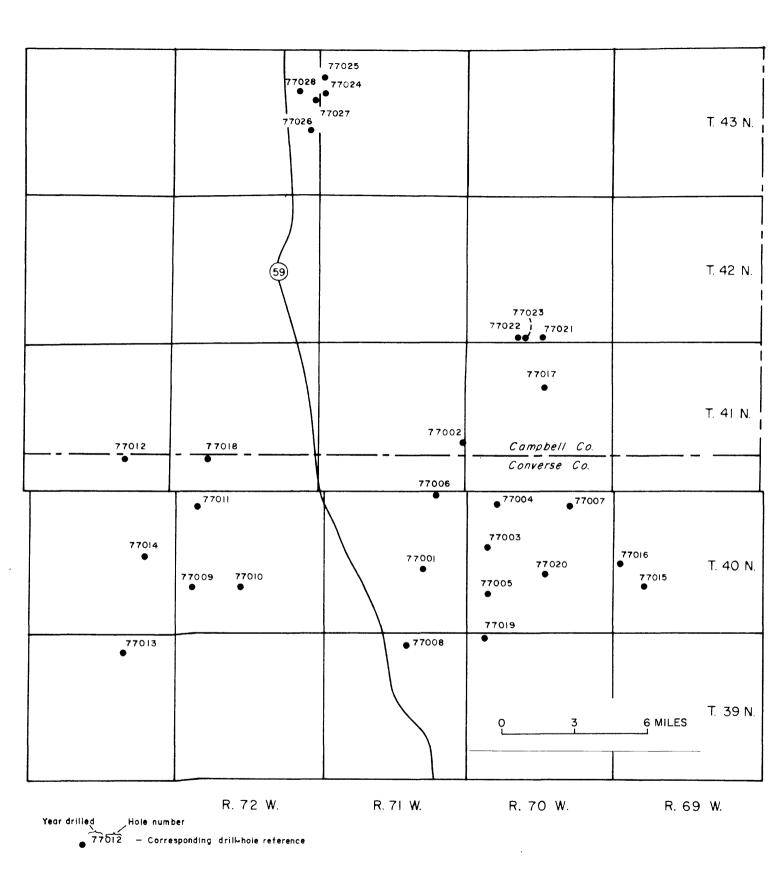


Figure 1.--Location of holes drilled during 1977 in Campbell and Converse Counties, Wyo.

Table 1.--Summary of information for eight coal samples from the Tertiary
Fort Union Formation, Converse and Campbell Counties, Wyo.

Sample	Hole	***************************************	Locat	ion		Depth	Coal
No.	No.		Sec.	T.N.	R.W.	interval (feet)	bed Name
D196189	CD-77008	SW ¹ 4NW ¹ 4	3	39	71	117.0-130.5	Wyodak Wl
D196190	CD-77006	NE ¹ 4NE ¹ 4	2	40	71	74.0- 85.5	Do.
D196191		do-				87.0- 97.0	Do.
D196192		do-				97.0-108.5	Do.
D196193		do-				186.0-198.5	Wyodak W2
D196194		do-				203.4-204.3	Do.
D196195		do-				206.5-221.2	Do.
D197320	CD-77017	SW ¹ 4SW ¹ 4	10	41	70	144.0-153.7	Wyodak

Table 2.--Coal analyses for eight coal samples from the Wyodak beds, Tongue River Member, Fort Union Formation, Converse and Campbell Counties, Wyoming.

[Analyses by U.S. Department of Energy, Coal Analysis Section, Pittsburgh, Pa., Forrest E. Walker, chemist in charge. Type of analysis: A, as received; B, moisture free; and C, moisture and ash free. ---, no data]

Sample	. Type	Proxim	Proximate analysis (percent)	is (perc	ent)	Ultimate	mate anal	lysis (percent)	ercent)		Heating	Air-dried	Forms of	Forms of sulfur (nercent)	nercent)	Free-	Ash-fusion temp.	n temp.	(0,)
No.	analy- sis	Mois- ture	Volatile matter	Fixed carbon	Ash	Hydro- gen	Carbon	Nitro- gen	0xy- gen	Sul- fur	value (Btu/1b)	loss (%)	Sulfate	Pyritic	Organic	ing index	deforma- tion	Soft- ening	Fluid
0196189	A B D	25.1	31.3 41.8 46.4	36.2 48.3 53.6	7.4	6.4 4.8 5.3	49.3 65.8 73.0	1.0	35.5 17.6 19.5	0.4 .5	8,430 11,260 12,490	6.9	0,01 .01	0.07 .09 .10	0.33 .44 .49	0.0	1,165	1,180	1,200
0196190	C B A	25.4	31.4 42.1 45.1	38.3 51.3 54.9	6.6	6.4 4.8 5.1	51.0 68.4 73.2	.8 1.1 1.1	36.6 18.8 20.1	4.2.6	8,630 11,570 12,380	10.3	.03	.05	.31	0.	1,215	1,230	1,250
D196191	A B D	24.5	32.7 43.3 45.9	38.6 51.1 54.1	5.6	6.4 4.9 5.2	52.4 69.4 73.5	1.1	36.0 18.8 19.9	2.6.6.	8,980 11,890 12,590	7.0	0.00.	.03	.20 .26 .28	0.	1,245	1,265	1,280
D196192	C B A	24.8	31.2 41.5 45.5	37.4 49.7 54.5	8.8	6.3 4.7 5.2	50.5 67.2 73.6	.8 1.1 1.2	35.5 17.9 19.6	2.6.6.	8,550 11,370 12,470	9.1	.0.	.05	.17 .23 .25	0.	1,190	1,215	1,245
D196193	C B A	26.7	28.8 39.3 42.3	39.3 53.6 57.7	5.2	6.2 4.4 4.7	50.5 68.9 74.2	1.0	37.2 18.4 19.8	466	8,510 11,610 12,490	11.9		<u>.</u>	.15 .20 .22	0.	1,210	1,225	1,245
D196194	C B A	26.8	29.0 39.6 43.6	37.5 51.2 56.4	6.7	6.3 4.5 5.0	48.8 66.7 73.4	.7 1.0 1.1	37.3 18.4 20.3	2.6.6.	8,270 11,300 12,440	12.2	 	.01.01	.18 .25 .27	0.	1,215	1,230	1,250
D196195	CBA	25.7	30.6 41.2 44.0	39.0 52.5 56.0	6.3	6.3 4.6 4.9	52.0 70.0 74.7	.8 1.1 1.1	36.0 17.7 18.9	4.6.6	8,800 11,840 12,640	9.8	.01	.0. .0. .0.	.16	o.	1,100	1,115	1,130
D197320	A W O	29.8	30.4 43.3 46.7	34.7 49.4 53.3	5.1	6.8 4.9 5.3	47.5 67.7 73.1	.8 1.1 1.2	39.5 18.5 19.9	ພໍຄໍຄໍ	8,190 11,670 12,580	15.0	.01	.06 .06 .07	.39	0.	1,210	1,225	1,245

Table 3.--Ash content and major- and minor-oxide and trace-element composition of eight coal samples from the Wyodak beds, Tongue River Member, Fort Union Formation, Converse and Campbell Counties, Wyoming.

0.2, 0.15, 0.1, respectively. The precision of a reported value is approximately plus-orminus one bracket at 68-percent, or two brackets at 95-percent confidence level] J. W. Baker, A. J. Bartel, Candice Bliss, J. C. Hamilton, R. J. Knight, Cindy McFee, V. M. Merritt, H. T. Millard, Jr., H. G. Neiman, G. D. Shipley, J. A. Thomas, M. L. Tuttle, and with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, and so forth, and are reported arbitrarily as midpoints of these brackets, 1.0, 0.7, 0.5, 0.3, J. W. Wahlberg. Coal ashed at 525°C. <, less than; --, not detected; N, not determined. Results of semiquantitative emission spectrographic analyses are based on their identity [Analyses by U.S. Geological Survey laboratories, Denver, Colo. Analysts: J. H. Christie,

Sample	A	A. Per	Percent a	ash, m	major-	and min	and minor-oxide, percent)	oxide		d tra	ce-el	ement	and trace-element compositions (pr	siti	ons of (ppm)	f ash	h
ON	Ash	$St0_2$	$^{A1}_{2}^{0}_{3}$	Ca0	MgO	Na_2^0	κ_2^0	$Fe_2^{0_3}$	1 1	T_{10}^{0}	P_2^05	so_3	Cu	1.1	W.	Pb	Zn
D196189	9.1	36	11	18	2.76	2.60	0.50	5.	2 0.	. 90	2.0	12	80	26	950	35	170
D196190	6.1	30	12	22	4.70	1.17	.50	5.	5	.90	2.0	14	89	14	190	35	214
D196191	5.1	24	11	24	07.9	.80	.30	4.	3 1	1.4 <	<1.0	14	156	24	170	35	113
D196192	8.5	4 4	17	14	4.20	.55	. 90	3,	0 1	1.4	2.0	8.8	136	29	115	35	418
D196193	6.2	37	15	15	4.80	1.63	.40	2.	9 1	1.4	2.0	8.0	125	28	40	40	470
D196194	8.4	40	17	14	3.40	1.20	.30	2.	5 1	1.7	8.5	3.8	61	16	34	90	65
D196195	5.6	32	14	19	5.10	1.84	.20	3,	6 1	£.	4.0	8.2	96	24	80	20	495
D197320	7.2	31	14	21	4.90	.27	.60	3.	2	96.	3.0	12	16	14	110	45	196
	H	B. Ser	Semiquantitative	itati	1 1	emission	spect	spectrographic	aphic	1 1	analyses	(ppm)	for t	trace	elements	ents	
	В	Ba	a Be	Ce	Ga	Ge	La	Mo	Nb	ΡN	Ni	Sc	Sr	Λ	Y	χÞ	Zr
D196189	200	3,0	000		. 30	1	70	7	ļ	<u> </u>	30	15 2	2,000	100	50	5	150
D196190	700	3,0	000	-	- 30	ì	70	7	ļ	1	20	15 2	2,000	100	50	5	150
D196191	1,000		3,000		- 30	1	ļ	!	20	z	30	15 1	1,500	100	20	7	150
D196192	700	0,5	3 000		- 70	1	70	7	30	ţ I	100	30 2	2,000	200	30	3	200
D196193	200	5,0	2 000		. 50	1	7.0	10	30	1	150	20 2	2,000	150	20	5	200
D196194	300	0,01	000 20	200	300	70	300	7	30	300	70	70	2,000	300	200	15	150
D196195	200		7,000 3		. 30	ł	100	7	30	i i	70	15 3	3,000	100	20	5	300
D197320	1,500		3,000 3		. 30	}	l i	50	<u> </u>	}	30	15]	1,500	100	30	2	150

Table 4.--Major, minor, and trace-element composition of eight coal samples from the Wyodak beds, Tongue River Member, Fort Union Formation, Converse and Campbell Counties, Wyoming.

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determined]
not
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t detected;
not
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than;
less
v.

Sample				A.	S	calculated		from ana	analysis o	of ash						å	Direc	t det	w	tions	uo	
74 diiib			-	(Per	(Percent)						(P_1)	(Ppm)					air-dried	led ((32°C)	coal ((bpm)	
NO.	S1	Al	Ca	Mg	Na	К	Fe	$_{ m T1}$	ŋ	Li	Mn	P	Pb	Zn '	As C	Co	Cr	Œ	Hg Sb	b Se	Th	Ö
D196189	1.5	0.53	1.2	0.15	0.18	0.038	0.33	0.049	7.3	2.4	98	800	3.2	15	0.6 2	2.0	5.4	30 0	0.05 0	0.2 0.5	5 1.4	1 <0.2
D196190	.85	.39	96.	.17	.053	.025	.23	.033	5.4	6.	12	530	2.1	13	.8	1.8	2.7	30	60.	.2	. 9.	× ×
D196191	.57	.30	.87	.20	.030	.013	.15	.043	8.0	1.2	8.7	<220	1.8	5.8	£.	.7	1.7	30	.05	.1 < .	1 .6	``. V
D196192	1.7	92.	.85	.21	.035	.064	.18	.071	12	2.5	8.6	740	3.0	36	.6	3.6	6.2	09	90.	.3	5 1.9	``
D196193	1.1	64.	99.	.18	.075	.021	.13	.052	7.8	1.7	2.5	540	2.5	29	.7	3.1	2.8	40	90.	.1.	4 1.2	``.
D196194	1.6	.76	.84	.17	.075	.021	.15	980.	5.1	1.3	2.9	3,100	9.7	5.5	2.	5.3 1	12 1	105	.02	. 0.1	.2 1.4	7.
D196195	.84	.41	.76	.17	920.	.009	.14	.044	5.4	1.3	4.5	980	2.8	28	.5	1.4	2.4	20	.04	. 2 < .	1 1.2	· · · · · · · · · · · · · · · · · · ·
D197320	1.04	.53	1.08	.21	.014	.036	.16	.041	6.5	1.0	7.9	940	3.0	14	.6	1.1	2.7	20	.05 <	.1 2.9	9 1.9	9 1.0
					C. Vz	Values C	calculated		from analysis	1	fo (mqq)	f ash by	1 .	emission	spectrography	rograp	hy					
	м	Ba		Be	a)	Ga		Ge	La	Mo	PP PP	PN		NÍ	သွ		Sr	>	¥		Yb	Zr
D196189	20	300	9	ł	i	e	•	ļ	7	0.7	1	ł		3	1.5	,	200	10	5	0.5	2	15
D196190	20	200	9	0.2	1	7	•	!	2	5.	ł	ł		٠ ٣	T		150	7	e	•	3	10
D196191	20	150	.0	ļ	ł	1.	. 5.	ŧ	ŀ	ł	1	Z	_	1.5		~	70	5	1	•		7
D196192	70	200	ō	.2	1	7	•	1	7	.7	7	ŧ	·	10	7	,	150	15	2	٠	2	15
D196193	30	300	9	•.5	ţ	e.	•	[2	.7	7	ł		10	7.1	7	150	10	æ	•	3	15
D196194	20	1,000	0	1.5	20	20		7	20	.7	7	20	_	7	7		200	20	15	i.	٠.	15
D196195	30	200	0	.15	1	1.5		1	2	٠,5	1,5	l		2	ч		150	٠	er.	•	3	15
D197320	100	200	9	.2	ŀ	2	•	1	ŧ	3	1	z		2			100	7	7	•	15	10

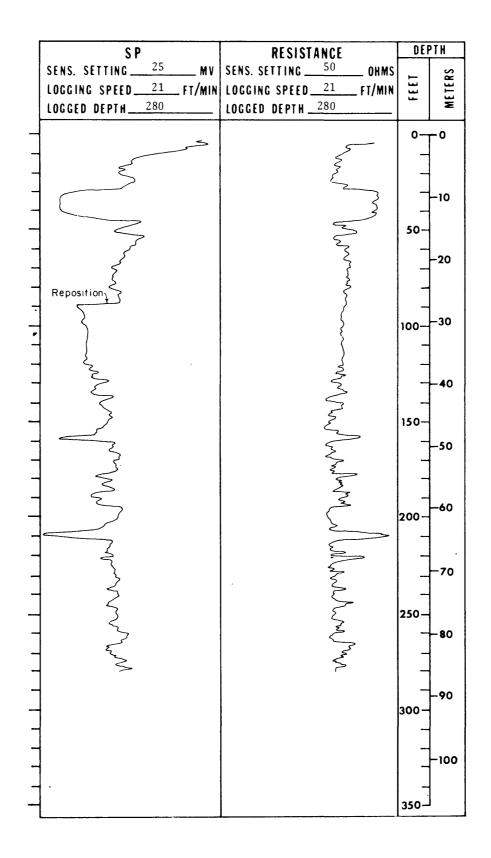
Table 5.--Elements looked for, but not detected, in coal samples from the Wyodak beds, Converse and Campbell Counties, Wyoming.

[Approximate lower detection limits in coal ash, as determined by the sixstep spectrographic method of the U.S. Geological Survey, are included for all elements except Cd. The reported Cd lower detection limit is for the atomic absorption spectroscopic method]

Element	Lower limit of detection in coal ash (ppm)	Element	Lower limit of detection in coal ash (ppm)
Ag	1	Pd	5
Au	50	Pr	200
Bi	20	Pt	100
Cd	1	Re	100
Ce	500	Sm	200
Dy	100	Sn	20
Er	100	Ta	1,000
Eu	200	Tb	700
Gd	100	Te	5,000
Hf	200	T1	100
Но	50	Tm	50
In	20	W	200
Lu	70		

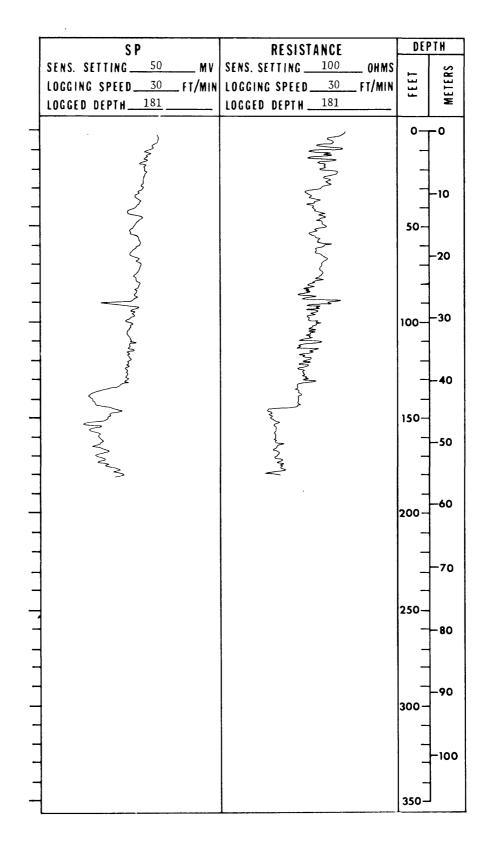
	AREA Southern Powder River Basin		QUAD	NAME Betty Re	eservoir		
	DATE STARTED 8/16/77 DATE C	OMP.	8/16/77	COUNTY	Converse \$1	ATE Wyom	ing
	LOCATION: SEC. 23 T. 40N , R. 71W	, F00T <i>I</i>	AGE LOC.	1600 FNL	550 fwl	GROUND ELEV 48:	18
	SIZE AND BIT TYPE: 4 3/4 Drag				TAGE 'CORING O		30
	DRILLING AGENCY: U.S. Geological	Survey	DR	ILL TYPE: Por	rtadrill 524	DEPTH TO WATER 4	1 ft
ļ	LITHOLOGY RECORDED BY Hollomon, Coppock	. Kistne	er GEO	PHYSICAL LOGS REC	ORDED BY F.B. K	istner ६ G./	. Hollomon
	REMARKS: 2-inch observation well in	stalled	to 105 ft	on 8/17/77	···		
ſ				AMMA	DENSIT		DEPTH
	LITHOLOGY	STR L0		RANGE <u>100</u> CPS EED <u>10</u> FT/MIN TH <u>258</u> ft		FT/MIN	FEET
_	O Siltstone and sandstone, light-gray, fine-grained sand		-				0_0
-	Coal, brownish-black to black, vit luster, conchoidal fracture, frag weathered to 40 ft		3				10
-	Sandstone, light-gray, to light- brnish-gray, fine-grained sand, well- 63 sorted			3			50- - -20
]	Sandstone, light-brownish-gray to		· · · · · · · · · · · · · · · · · · ·				
-	brownish-gray, fine-grained to very fine grained, slightly micaceous						10030
1	119		-	Mayond			40
-							150-
	Siltstone and sandstone, light-gray						
-	to light-brownish-gray, fine-grained to very fine grained sand; 3 ft coal at 157 ft; 5 ft coal at 207 ft			All many May Joseph Joseph			200
1							
+	258 L.T.D.			3			250 - 80
1				,			
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1							-100

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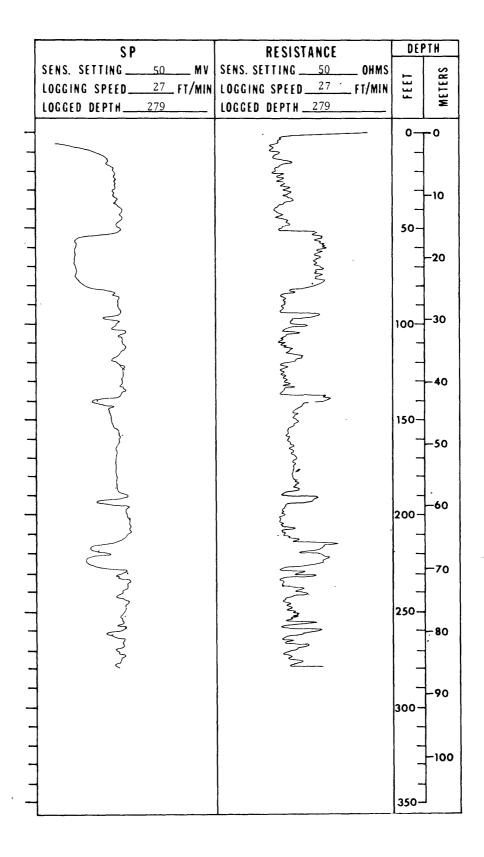


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	AREA Southern Powder River Basis	n	QUAD NAMI	Betty	Reservoir NE		
	DATE STARTED 8/31/77 DATE	COMP.	8/31/77	COUNTY	Campbell ST	ATE Wyo	ming
	LOCATION: SEC. 25 T. 41N , R. 71W	, FOOTA	GE LOC.	FNL 1980 FSL	FEL 1200 ▼WL	GROUND ELEV 473	0
	SIZE AND BIT TYPE: 4 3/4 Drag		ROTA	F00 IRY 396	TAGE CORING O	TOTAL DEPTH 39	6
	DRILLING AGENCY: U.S. Geological S	urvey	DRILL T	YPE: Por	tadrill 524	DEPTH TO	_
-	LITHOLOGY RECORDED BY Hollomon, Coppoc	k, Riglir	n GEOPHYSI	CAL LOGS REC	ORDED BY Kistne	r, Hollomon,	Riglin
	REMARKS:						
١			GAMM		DENSI1		DEPTH
	LITHOLOGY		I.C. <u> </u>		T. C SEC RANGE LOGGING SPEED		FEET METERS
			LOGGED DEPTH _3	1	LOGGED DEPTH		불
-	0						o _ _0
7			3				-
]			₹				-
4		20.11.00 20.11.00 20.11.00	The state of the s				<u> </u>
\dashv	Siltstone and sandstone with possibl			!			50-
4	carbonaceous shale at 85 ft		Repositi				-20
			***	₹			
4				3			_
\dashv			•				10030
1			نـ				
7	133 Sandstone		;				-40
\dashv	143		1				
\dashv			- -	The Charles and the Charles an			150-
1	Siltstone		ž.	-			
\dashv					•		_
+	195		S	5			60
\exists	Coal		5				200
4	5042		Ę,				
4	236		£				70
4	Siltstone		Š	<u>-</u>			
1	of the conte		3	-			250 80
4	277		A Property to the state of the	•			
+			~				-
	Cc a:		*				-90
1	316 Siltstone and sandstone		\{\rightarrow}				300-
4	525 STEES CORE WITH SWITCHIE			- -			
4			**				-100
1			12				350
- 1]	13	3-	1		JJJU

		7			200	\T.II
			GAMMA	DENSITY	DEF	
	LITHOLOGY	STR IP LOG	T. C. <u>4</u> SEC. RANGE <u>100</u> CPS	T. CSEC. RANGE CPS		METERS
	2111102001	SI	LOGGING SPEED <u>15</u> FT/MIN		FEET	ETE
			LOGGED DEPTH 396	LOGGED DEPTH		Ξ
_		L			350-	
_		::::::::::::::::::::::::::::::::::::::	-			
	Siltstone and sandstone				7	-110
_						
	396 L.T.D.	∷ =::				-120
-					400-	
-					l ⊣	
-						
_						-130
_						
_					450-	
_						-140
						.40
Ī					7	
_						
-					-	-150
_					500-	
-					1 -	
-					1 -	-160
_						-160
_						
_					550-	
					330	-170
_						
-						
-					-	-180
_					600-	
-					-	
-						100
_						-190
_						
_					650-	
_					030	-200
					7	
_						
_						
_						–210
_					700-	
-					-	
_			·			-220
-			,		4	220
-						
_] ,		750	
		<u> L</u>	14		<u> </u>	

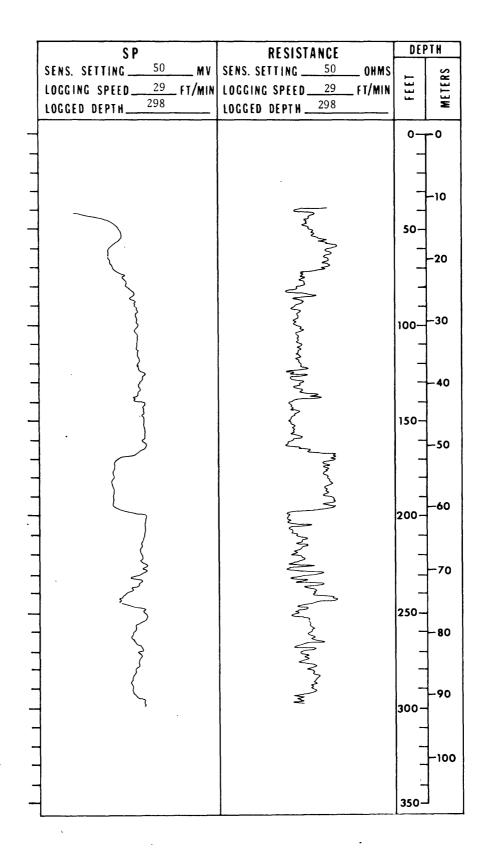


						1 01 2
AREA	Southern Powder River Ba	asin	QUAD NAME I	Setty Reservoir		
DATE	STARTED 9/1/77 DAT	E COMP.	9/1/77 COU		ATE Wyomi	ng
LOCAT	ION: SEC. 18 T. 40N , R.	70W , FOO	TAGE LOC. 1450	" FMY FEL FSL 50 KWKK	GROUND ELEV 484	5
SIZE	AND BIT TYPE: 4 3/4 Drag	g	ROTARY 28	FOOTAGE BO CORING O	TOTAL DEPTH 280	
DRILL	ING AGENCY: U.S. Geolog			Portadrill 524	DEPTH TO WATER	
	OGY RECORDED BY Hollomon, Copp		<u> </u>		Hollomon	
REMAR		, , ,				
			0.4.4.4.4	DENCI	T	DEPTH
		م	GAMMA TC 4 SEC. PANCE 100	DENSIT CPS T.C.— SEC. RANG		
	LITHOLOGY	STRIP LOG	LOGGING SPEED 18			FEET
			LOGGED DEPTH 278 ft	LOGGED DEPTH	1	" ¥
0	Cileaters light olive dway					0-0
-	Siltstone, light-olive-gray, laminated, trace of limonite	=====	3			4
1	alteration, weathered to 30 ft					-
35	Claystone, dusky-yellowish-bro	own 🚞				-10
49	carbonaceous .		No.			
]	Coal, black, high luster, fra	g-	{	>		50-
]	ment size; 0.2 cm to 1.0 cm		Š Š			
79	Claystone, dusky-yellowish-br	own	Ex]
91-94	carbonaceous Coal, black		3			4
1 31-34		HE SE			1	0030
{ ,	Siltstone and claystone, ligh gray. Sandy zones at 98 ft a					-
	116 ft					
125_130	Coal, black	====				40
133-132			~			150
	Siltstone, gray, some carbona ceous shale	- 272				150
ļ						4
188-191	Coal, black					
1	Claystone, gray				2	200
212	Coal, black, dull luster, fra mented; with stringers of silt					4
225	stone at 217 ft		3			
]	C41666000 and -1-waters		= 3] ~
]	Siltstone and claystone, gray with thin interbeds of poorly					250-
	sorted fine sandstone				ľ	80
278 L.T	' ח					4
2/0 1.1						4
						90
	·];	300-
						┪
]						
			16			350
			-			

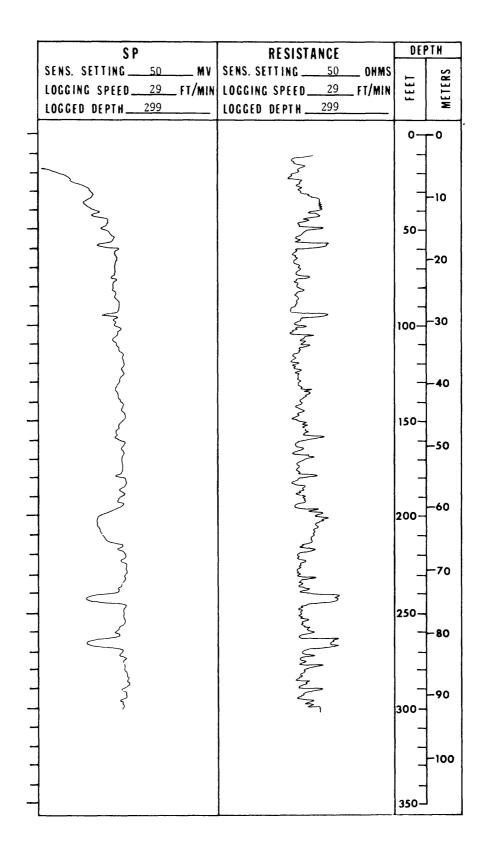


	AREA Southern Powder River Basin	QUAD NAME Betty Reservoir							
	DATE STARTED 9/2/77 DATE (COMP.	9/3/77		Converse		ATE Wyomi	ng	
	LOCATION: SEC. 5 T. 40N , R. 70W	, FOOT	AGE LOC.	1250 FSL	500	XXX FWL		30	
	SIZE AND BIT TYPE: 4 3/4 Drag		RDT	1RY 300	TAGE CORING O			00	
	DRILLING AGENCY: US Geological Sur		DRILL 1	YPE: Port	tadrill 524		DEPTH TO WATER	40 f	t
	LITHOLOGY RECORDED BY Hollomon, Coppo	ck, Rigl	in GEOPHYS	CAL LOGS REC	ORDED BY	L.	Riglin		
ł	REMARKS:								
								D.C.	PTH
į		ما	GAM M T. C. <u>4</u> SEC RAN			ENSIT Range	Y CPS		
	LITHOLOGY	STRIP LOG	LOGGING SPEED	<u> 18</u> ft/min			FT/MIN	, —	METERS
١			LOGGED DEPTH _	299 ft	LOGGED DEP	TH			Σ.
1	0							0-	T°
1	Siltstone and claystone, gray,			3				-	•
4	weathered to 25 ft		-						-10
$\frac{1}{2}$	41		<u> </u>					-	
+	Coal, dark-brown to black, dull luster, conchoidal fracture, with							50-	-
	poorly defined cleat pattern		De la companya de la		,				-20
4	71			\$				-	-
4				\$				_	
_	Claystone, brownish-gray, with thin carbonaceous interbeds. Possible		\$					100-	⊢30
	coals; 1 ft coal at 84 ft, 1 ft at 136 ft		3					_	1
\dashv				>				_	40
\dashv				3				-	
1		三		3				150-	1
_	Coal, black, fractured, slightly							_	-50
\dashv	visible cleat pattern, appx. fragment size; 0.2 to .06 cm		المحمل المحمد					-	-
\forall	196							_	-60
		国						200-	
4			** ***	5				_	-
\dashv	Siltstone and claystone, light-							-	-70
1	olive-gray, poorly sorted with trac of carbonaceous material. Possible			F ==				-	1
1	2 ft coal at 228 ft		ح					250 -	80
\dashv			-					-	"
+				5				-	1
	299 L.T.D							300	-90
4								_]
+								-	
+								-	<u> </u> -100
			10					350-]
	olive-gray, poorly sorted with trac of carbonaceous material. Possible 2 ft coal at 228 ft		18					250 — 	

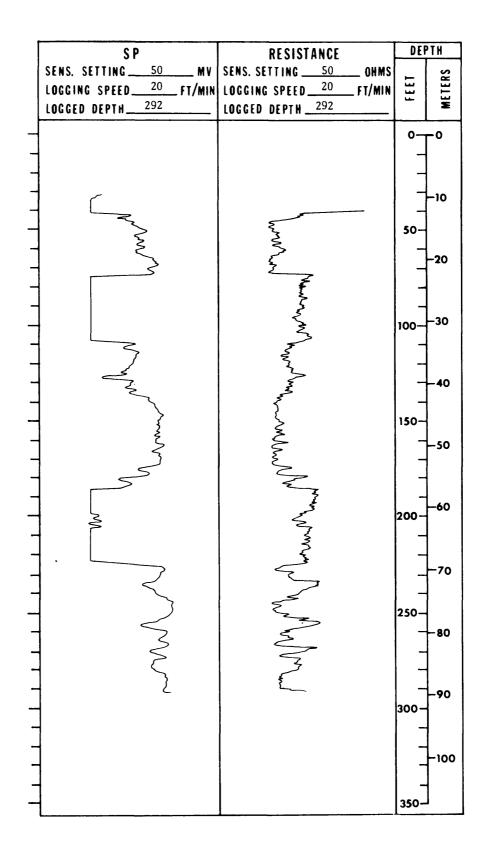
REMARKS.



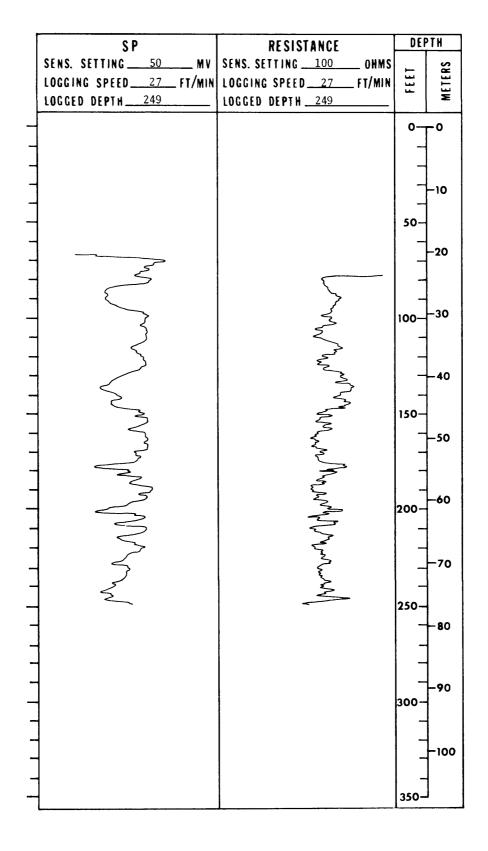
	LU	, , , , , , , , , , , , , , , , , , ,	J 0L0L0			SHEE	T 1 OF 2
AREA Southern Powder River Basin		Qu	JAD NAME	Betty 1	Reservoir		
DATE STARTED 9/4/77 DATE C	OMP.	9/4/77		COUNTY C	onverse	STATE Wyomi	ng
LOCATION: SEC. 30 T. 40N , R. 70W	, F00	TAGE L	DC.	2600 FNL	300 FE	CROUND 49	25
SIZE AND BIT TYPE: 4 3/4 Drag				F00 RY 300	TAGE (CORING 0	TOTAL	00
DRILLING AGENCY: U.S. Geological S	Survey			YPE: Porta		DEPTH TO	1 ft
LITHOLOGY RECORDED BY Hollomon, Coppoc		lin		CAL LOGS REC		G. A. Hollomon	JI h
REMARKS:	K, KIE	1111	1			3. Tt. Tto I Tomorr	
			GAMMA	n -	nen	SITY	DEPTH
1 1 T 11 O 1 O 0 V	d 5	T. C		E 100 CPS		NGE CPS	
LITHOLOGY	STR			18FT/MIN		FT/MIN	FEET
	<u> </u>	LOGGE	D DEPTH _29	99 ft	LOGGED DEPTH		*
0 Siltstone and claystone, brown to				>			° ⊤°
gray, minor carbonaceous shale							
24 Coal, black, weathered to 30 ft with	===	5]
siltstone split from 40 to 41 ft		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \					710
173	··-					,	50-
4							-20
· ·			- 2°				-
Siltstone and claystone, gray, minor	===		E	-			
carbonaceous siltstone, 4 ft coal at 48 ft, 5 ft coal at 56 ft, 2 ft coal				-			100 -30
at 94 ft; possible thin coals at 158 ft and 177 ft			5	₹			
11 and 1// 11				<u>}</u>			
			7	_			40
			3				
			=				150-
				5			
4		}		: 			
106			Ē	 L 			-60
Sandstone, gray, very fine grained			*				200-
sand, sorted, sub-angular 214			3				
Siltstone and claystone, gray, with minor carbonaceous siltstone							70
240-45 Coal, black		_	-	-			1 4
Claystone and siltstone, gray to		! 1	E	* *			250 —
brown, carbonaceous 264-69 Coal, black		_		 -			80
Claystone and siltstone, gray to				2			-
brown, carbonaceous							
299 L.T.D	F			<u> </u>			30090
-					ļ		-
4							100
]							""
]			20				350
	<u></u>	L	20		L		350



A	REA Southern Powder River Basin	QUAD NAME Betty Reservoir										
DI	ATE STARTED 9/5/77 DATE C	P. 9/5/77 COUNTY Converse STATE Wyoming										
L	OCATION: SEC. 2 T. 40N, R. 71W	TAGE LO	OC. 100		950 FEL	GROUND ELEV 4650)					
SI	IZE AND BIT TYPE: 4 3/4 Drag			ROTARY 2	23 F00	TAGE CORING 77	TOTAL DEPTH 30	10				
DI	RILLING AGENCY: U.S. Geological St	ırvey		DRILL TYPE	Port	adrill 524	DEPTH TO WATER	41 ft				
	THOLOGY RECORDED BY Hollomon, Coppos	k, Rig	glin	GEOPHYSICAL	LOGS REC	ORDED BY L. Ri	glin					
RE	REMARKS:											
				GAMMA		DENSI		DE	PTH			
	LITHOLOGY	STR IP LOG		SEC RANGE1	1			FEET	METERS			
		2		IG SPEED <u>17</u> D DEPTH <u>297</u>	+1/MIN	LOGGING SPEED LOGGED DEPTH	· ·	FE	MET			
10								0-				
4				<u>_</u>	_			,				
\dashv	Siltstone, grayish-orange to light-			Z.	_			-				
1	gray							-	-10			
				2				-				
1				Z	-			50-				
73					<u>`</u>			_	-20			
-	Coal, black, vitreous luster, sub-		1					-	į į			
-	conchoidal fracture		**************************************					-	-30			
108	3		E					100-	50			
_				3				-				
-	Siltstone and claystone, light-gray		•					_	-40			
1	to grayish-brown			3	-			-	İ			
1				Ž	•			150-	1			
]			• •	3	-				-50			
-	(C. 1.11.1. it and larger gib							_				
┥	Coal, black, vitreous luster, sub- conchoidal fracture		5					-	-60			
$\frac{198}{200}$	B Carb sh, grayish-brn to brnish-blk 7 Coal, brownish-black, dull to vit-		٤					200-	-00			
] .	reous luster, fragmental		5		:			-				
226	5	333	•	-			1		70			
4	Siltstone and carbonaceous shale,			-				_				
1	light-gray to brownish-black, pos 3 ft coal at 256 ft and 3 ft coal at				-		ļ	250 —	}			
1	269	===			-			_	-80			
				1	-			_	1			
20	7 L.T.D.				-			_	-90			
- 1							· · · · · · · · · · · · · · · · · · ·	300-	F**			
1								-	1			
]								-	-100			
_								_				
4				22				350-]			

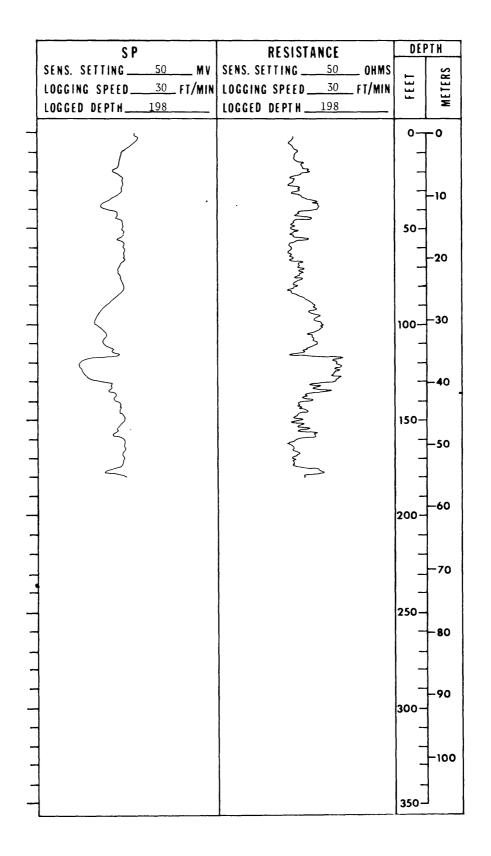


AREA Southern Powder River Basin	QUAD NAME Coal Bank Draw							
DATE STARTED 9/6/77 DATE C	9/7/77	COUNTY	Converse	ST	ATE Wyomi	ng		
LOCATION: SEC. 2 T. 40N, R. 70W	, FOOT	AGE LOC.	650 FSL	450	FWL	GROUNO ELEV 482	5	
SIZE AND BIT TYPE: 4 3/4 Drag		ROT	F00 ARY 260	TAGE CORING O		TOTAL OEPTH 260)	
DRILLING AGENCY: U.S. Geological	Survey	DRILL	TYPE: Porta	drill 524		DEPTH TO WATER	'8 ft	
LITHOLOGY RECORDED BY Hollomon, Coppe	ck, Rig	lin GEOPHYS	ICAL LOGS REC	ORDED BY	L.D.	Riglin		
REMARKS: Lost circulation at	120 C+							
lost circulation at	120 It							
		GAMI			ENSIT	Υ	DEI	PTH
LITHOLOGY	STRIP LOG	T. C. 4 SEC RAI				CPS	13	E RS
	ST	LOGGING SPEED _ LOGGED DEPTH _	ľ	LOGGING SE		FT/MIN	FEET	METERS
0		-		LOUGED DE			0-	
	7 7 4	3						
Clinker, red to light-grays and blues,	7 - 1		E					
fine sandstone to siltstone, poorly sorted, sub-angular to angular prtcls,	7. 1 .	5	-			İ	_	-10
traces of chert and ash. Weathered to	7 1		3					
	1.7.1						50-	!
	7 7 7		-				-	-20
	<u>^</u>						_	
07	71						-	-30
97							100-	
Sandstone and siltstone, light-gray, siltstones with traces of carbonaceous		5					-	
material at 104 ft and 120 ft		1			•		-	-40
146		5					150-	
							-	
	# <u>.</u>		-				_	-30
Sandstone and siltstone with possible	*****	É					_	
coals at these intervals, 2 ft at 176 ft, 2 ft at 199 ft and 1 ft at 246 ft			-				200-	-60
1			-				-	
1							_	
	***						-	-70
247							250 <i>-</i> -	
255 L.T.D <u>.</u>								-80
1			•				-	
1							-	1
						•	300-	-90
							_	
1							-	-100
							-	100
		24					350-]
l	1 1			L			1555	



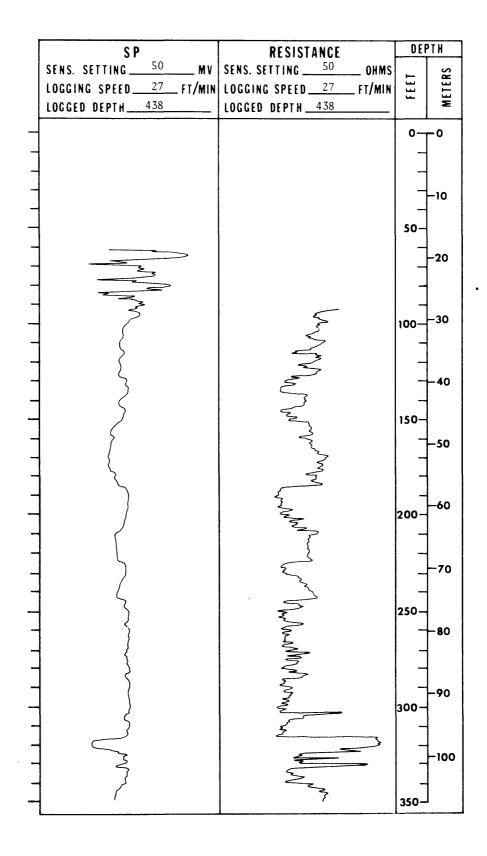
AREA Southern Powder River	Basin QU	D NAME Bet	ty Reservoir	
DATE STARTED 9/8/77	DATE COMP. 9/8/77	COUNTY	Converse \$1	TATE Wyoming
LOCATION: SEC. 3 T. 39N	, R. 71W , FOOTAGE LO	2350 x	1 7724 1450 FWL	GROUND ELEV 4965
SIZE AND BIT TYPE: 4:	3/4 Drag		FOOTAGE CORING 16	TOTAL DEPTH 180
DRILLING AGENCY: U.S. G	eological Survey		Portadrill 524	DEPTH TO LS
ITHOLOGY RECORDED BY Hollom	on, Coppock, Riglin	GEOPHYSICAL LOGS I	RECORDED BY L.	Riglin
REMARKS:				

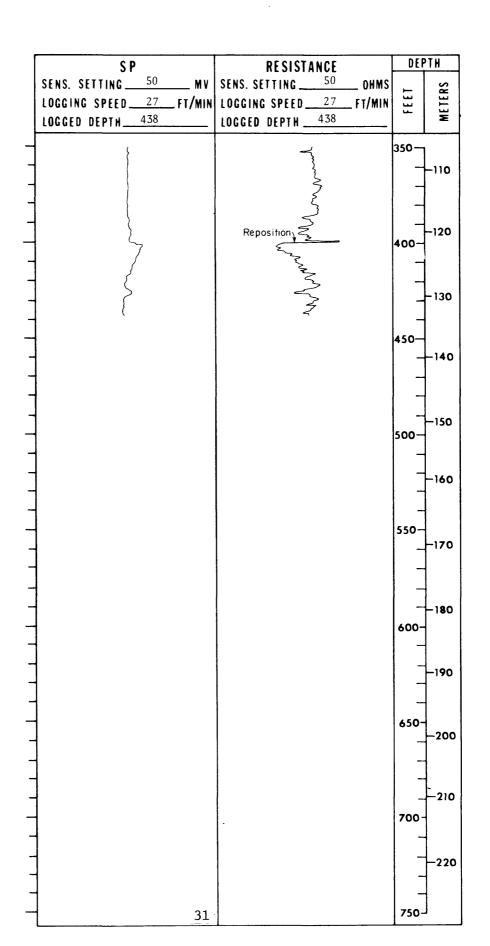
תכ	MARKS:				
	LITHOLOGY	STRIP LOG	GAMMA T.C4 SEC.·RANGE 100 CPS LOGGING SPEED 18 FT/MIN LOGGED DEPTH 179 ft	DENSITY T. C.— SEC. RANGE ————————————————————————————————————	METERS HIA30
130	Siltstone and sandstone, yellowish-gray to medium-light-gray, fine-grained to very fine grained and, sub-angular weathered to 50 ft with trace of limonite alteration Sandstone, light-gray to medium-light-gray, medium-to fine-grained sand, angular to sub-angular grains Coal, brownish-black, moderate luster conchoidal fracture Siltstone, light-gray to medium-light-gray, 3 ft coal at 156 ft, 1.5 ft coal at 175 ft L.T.D.		26		0—0 10 50—-20 20 40 50 50 70 70 70 90 350—-



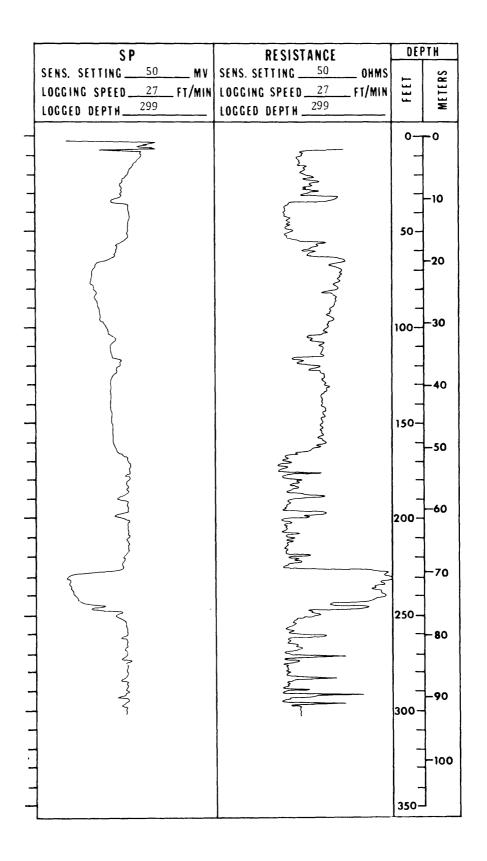
AREA Southern Powder River Basin		Qu	AD NAME	Coal Dr	·aw				
DATE STARTED 9/18/77 DATE C	OMP.	9/18/7	COU	INTV	onverse	ST	ATE Wyo	ming_	
LOCATION: SEC. 30 T. 40N, R. 72W	, F00			FNL 0 FSL	2350	FEL FWL	000000	010	
SIZE AND BIT TYPE: 4 3/4 Drag				F00 440	TAGE CORING O		TOTAL DEPTH	440	
DRILLING AGENCY: U.S. Geological	Survey		DRILL TYPE:		tadrill 52	4	DEPTH TO WATER	92ft	
LITHOLOGY RECORDED BY Hollomon, Coppos			GEOPHYSICAL L	OGS REC	ORDED BY	L. R	iglin		
REMARKS:									
	1		GAMMA			DENSIT	·Y	DEP	TH
LITHOLOGY	STR IP LOG	LOGGIN	SEC. RANGE _10 IG SPEED11 D DEPTH437	- 1		PEED	CPS FT/MIN		METERS
Sandstone, light-gray to grayish- orange, very coarse grained to m- grained sand, sub-angular, weathered to 90 ft			Martin and Mary Martin And Martin	ΛΜ				50-	-10 -20
127 Siltstone, light-brownish-gray 150 Sandstone, light-gray, very coarse								150	- 4 0 -50
grained to medium-grained sand, sub- rounded grains				-					-30
Sandstone and graded siltstones, light-brownish-gray, grades from silt size particles to very fine grained sands								200-	-60
Siltstone, light-brownish-gray, with very fine grained sands, carb shale zones								250 -	-80 -90
Coal, brownish-black to black, dull 319 to vitreous luster, fragmental 325 Siltstone and carbonaceous shale, light-gray to brownish-gray 342									-100

						7
}			GAMMA	DENSITY	DEPTH	4
	LITHOLOGY	STR 1P LOG		T. C. — SEC. RANGE CPS	T RS	
	LIINVLVUI	IS 01	LOGGING SPEED $\frac{11}{477}$ FT/MIN		FEET	
1		<u> </u>	LOGGED DEPTH 437	LOGGED DEPTH		
4			3		350-7	
4	Sandstone, medium-light-gray to light-brownish-gray, very coarse		The state of the s		-110	
4	light-brownish-gray, very coarse grained to fine-grained sand, sub-rounded grains		-		4	
4	rounded grains				4	
4					- -120	
\dashv	401				400-	
4	Sandstone, medium-light-gray, fine-		3		-	
4	Sandstone, medium-light-gray, fine- grained to very fine grained sand				-	
\dashv			77			
4	437 L.T.D.			•	4	
\dashv					450—	
+					-140	
4					4	
1					1	
1					-150	
٦					500	
٦					1	1
]						
				,	550-	
4						١
						١
4						1
4					180	l
4					600-	
4						
4					-190	
4						
\dashv		1			-	
\dashv					650-	
4					200	
\dashv					-	
٦					-	
Ⅎ					210	
\exists					700	
1						
7]			-220	,
			20		750	
			29	I	750-1	1

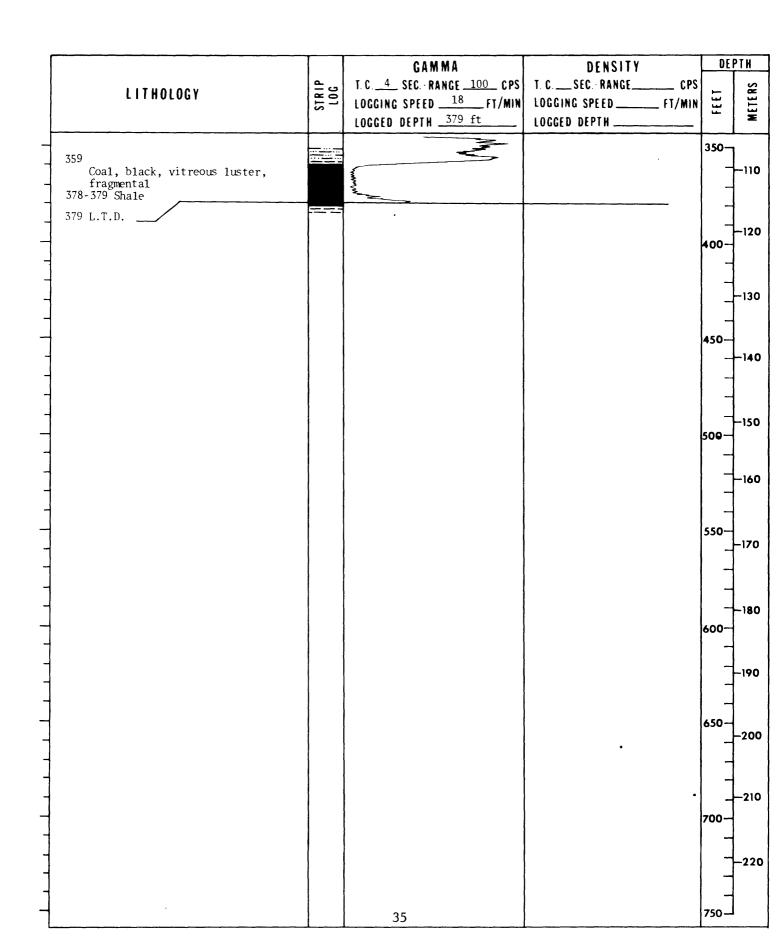


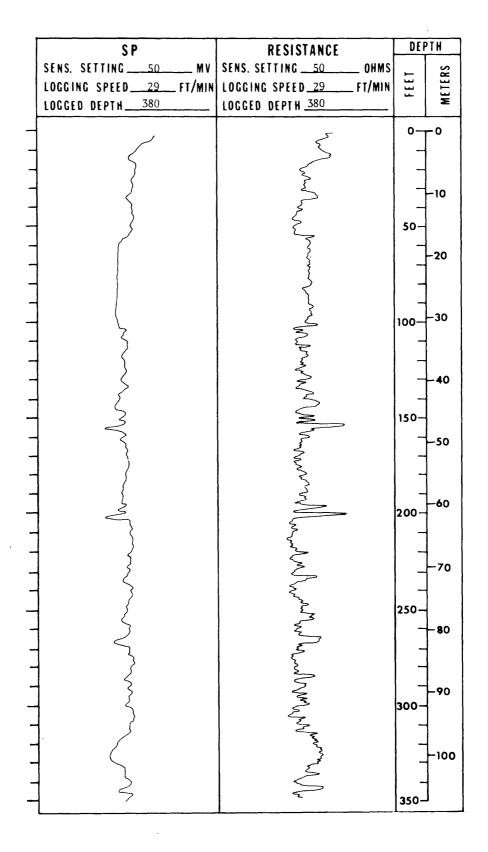


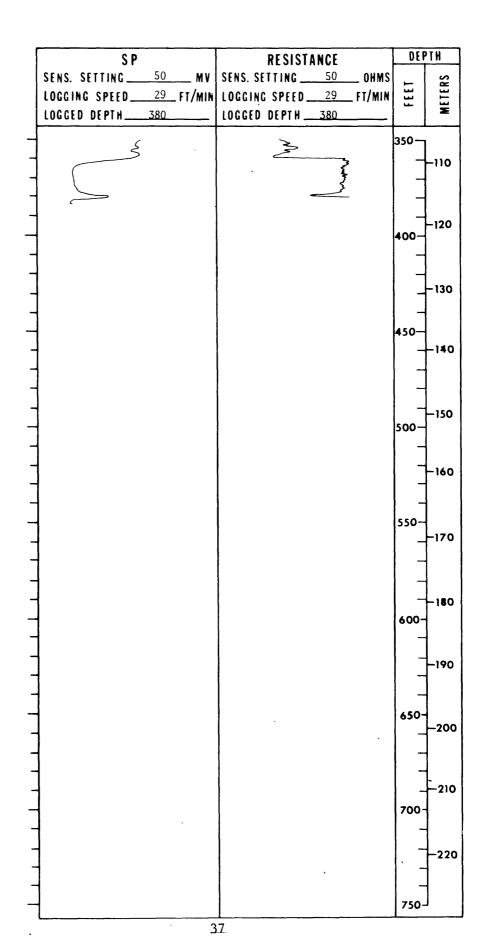
					SHEET 1	. Uf 2
AREA Southern Powder Rive	r Basin	QUAD NAM	E Coal Draw	<i>I</i>		
DATE STARTED 9/19/77	DATE COMP.	9/19/77	COUNTY Co		ATE Wyoming	·
LOCATION: SEC. 28 T. 40N ,	R. 72W , FOOTA	AGE LOC.	1500 fal	FEL 1000 ≠₩६	GROUND ELEV 4825	
SIZE AND BIT TYPE: 4 3/4 D	rag	ROT		TAGE CORING O	TOTAL Depth 300	
DRILLING AGENCY: U.S. Ge	ological Survey	DRILL	[YPE: Porta	ıdri11 524	DEPTH TO WATER 7	ft
LITHOLOGY RECORDED BY Hollomor		n GEOPHYS	ICAL LOGS REC	ORDED BY L. Ri	glin	
REMARKS:						
		GAMN		DENSIT	•	DEPTH
LITHOLOGY	1 = 1			T. C. — SEC RANGE	CPS	. &
- · · · · · · · · · · · · · · · · · · ·	S	LOGGING SPEED LOGGED DEPTH	<u>17 </u>		•	METERS
0		LUGGED DEFIN _		LOGGED DEPTH		1
Sandstone, grayish-orange to	dark-	2				°T°
yellowish-orange, very fine to coarse-grained sand, angu	grained					
grains. Weathered to 30 ft 34			-			-10
Siltstone and sandstone, lig to dark-gray, very fine grai	ht-gray	-	Z			- 1
55	<u></u>	-	- X-5-3		50	0 −
	X	Ę				-20
		1	-			
Sandstone, light-gray, very	coarse	3	-		100	30
grained to medium-grained sa rounded to sub-angular, very	ınd, sub-∵∵∷					\exists
sandstone						-
		3	-			+40
		AND THE PARTY AND THE SERVICE SERVICES AND THE SERVICES A			150	٥
160		1				50
						- 30
Siltstone and sandstone, lig to grayish-brown, very coars						-
very fine grained sand, mind of carbonaceous shale		-	_ <		20	-60
					20	
227		•				4
Coal, black to dark-brown, f	rag	}				- 70
240						+
248		~	<u> </u>		25	- L
Siltstone, light-gray to dan carbonaceous. 2 ft coal at			-			80
						-90
299 L.T.D.					30	
						4
]
		32			25	



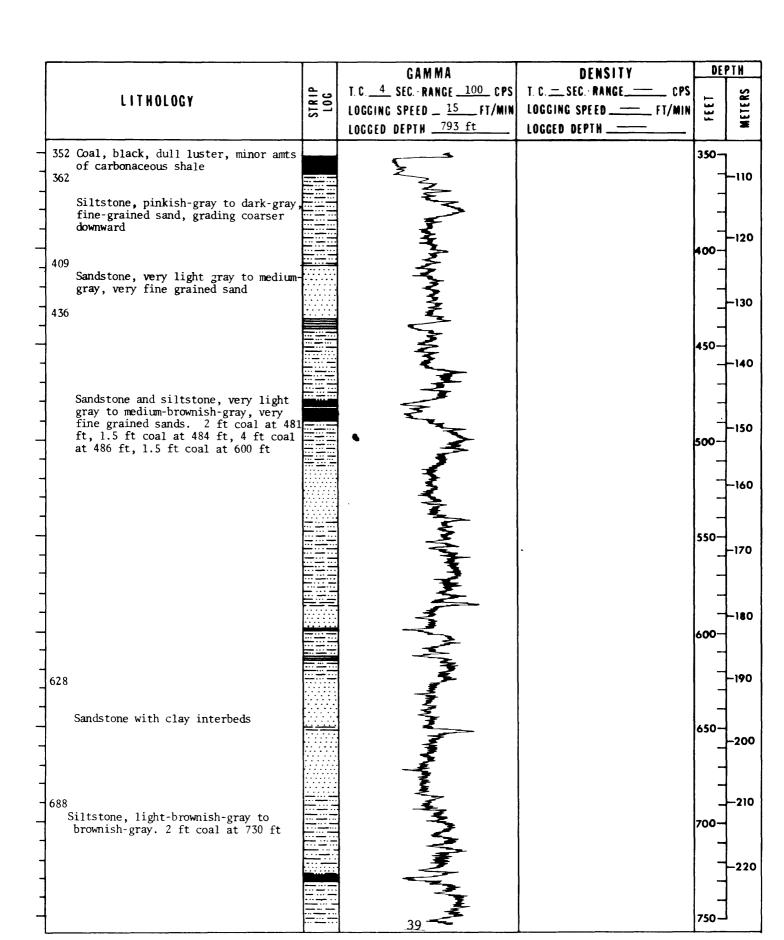
A	REA Southern Powder River Basin		QUAD NAME Coal Dr	aw	
D	ATE STARTED 9/20/77 DATE C	OMP.	9/20/77 COUNTY	Converse STATE Wyomi	ng
L	DCATION: SEC. 6 T. 40N, R. 72W	, F00		FEL GROUND 489	
	IZE AND BIT TYPE: 4 3/4 Drag		F00	TAGE TOTAL CORING 0 DEPTH 380	
D	RILLING AGENCY: U.S. Geological S	Survey	DRILL TYPE: Port	adrill 524 DEPTH TD WATER	LS
LI	THOLOGY RECORDED BY Hollomon, Coppos				
R	EMARKS:				
			GAMMA	DENSITY	DEPTH
	LITHOLOGY	STR 1P LOG	T.C. <u>4</u> SEC. RANGE <u>100</u> CPS Logging speed <u>18</u> ft/min		FEET METERS
		S	LOGGED DEPTH 379 ft	LOGGED DEPTH	ME ME
0					o _ o
1	Claystone and sandstone, dark-				-
1	yellowish-orange to light-gray, very coarse to very fine grained sand,		3		
4	weathered to 35 ft, limonite alteration		5		7-10
┦ ,					50-
- } 5	†		A Mary May Mary Mary Mary Mary Mary Mary		-20
]	Sandstone, light-gray to medium- gray, very coarse grained to med-		\(\)		
4	grained sands, sub-rounded		A.		
10	02		*		10030
1					-
1			<u> </u>		-40
-					
4	Siltstone, light-gray. Possible 2 ft coal at 152 ft, 3 ft coal at 199				150-
1	ft				- -50
1					
4					
20	03				200
1 -			3		-
]			=		
-					
-	Claystone and siltstone, dark-gray				250 —
1	to dark-brown, carbonaceous				80
]		量	3		
1					-90
٠.	7.7		3		300-
d 30	Siltstone and conditions were light				-
1	Siltstone and sandstone, very light gray				100
34	46 Siltetone on lelevite		*		
-	Siltstone and claystone, light-gray to dark-gray		34		350







					SHEE	T 1 OF 5
AREA Southern Powder River Basin		QUAD	NAME Coal Dr	aw		
DATE STARTED 9/21/77 DATE (OMP.	9/27/77	COUNTY		TATE Wyor	ning
LOCATION: SEC. 26 T. 41N , R. 73W	, F00	TAGE LOC.	1800 FSL	200 FWL	CROHND	lO ft
SIZE AND BIT TYPE: 4 3/4 Drag				OTAGE O	TOTAL	20
DRILLING AGENCY: U.S. Geological	Summer	. 10	RILL TYPE: Port		DEPTH TD WATER	5 ft
LITHOLOGY RECORDED BY Hollomon, Coppose		l l	EOPHYSICAL LOGS RE		ollomon	·········
REMARKS: Drilled and logged foot.	200 00				ft + 780 ft)	
Composite log logged th	rough	drill rods	below 30 ft.	wid obits are (40	10 . 700 107	
			GAMMA	DENSI	TY	DEPTH
LITHOLOGY	STRIP LOG		SEC. RANGE CPS	T. C SEC. RANG	E CPS	_ \ <u>&</u>
		1	SPEED <u>15</u> FT/MII	i		FEET
		LOGGED D	EPTH <u>793 ft</u>	LOGGED DEPTH _		
0						│ °丁°
-		=				
-						10
Siltstone, medium-light gray, 5 ft						-
coal at 28 ft, brownish-black to blk vitreous luster, conchoidal fracture			3			50-
Carbonaceous shale at 60 ft			7			
		1	5			
1					•	1 -
		5				10030
			3			
123		₹				40
Sandstone and siltstone, gray; very		\$	_			"
fine grained sand		2	5-			150-
177						-50
173						
			}			1 4
Siltstone, medium-light-gray, minor sand zones		-	*			20060
		_				-
230 Coal, brownish-black to black, vit					•	70
to dull luster, conchoidal fracture		1				
		1	*			250
1						-80
Siltstone and sandstone, medium-1t-			3			-
gray to dark-gray, fine-grained sand			3			
1						300-
· ·		_	and the same of th			-
1			\$			1 -100
].			<u> </u>			
			38			350

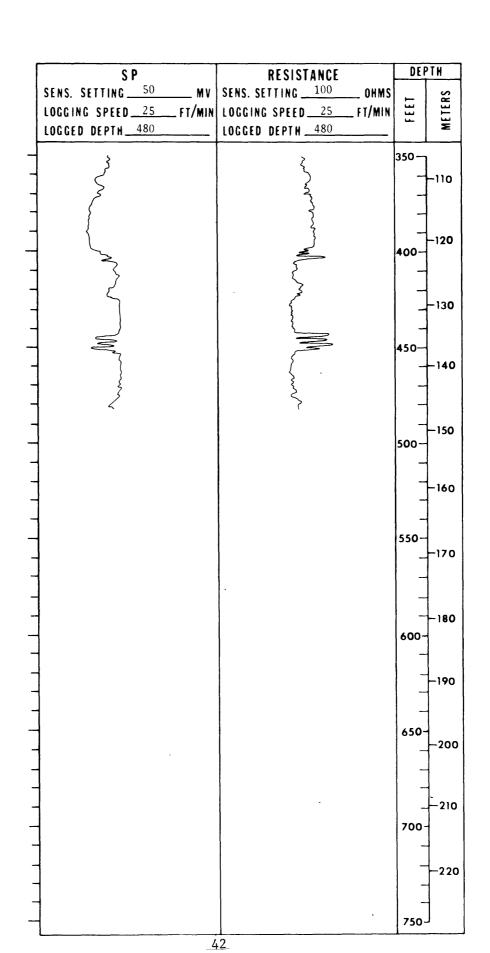


		, , ,	CAMMA	DENCITY	DEPTH
			GAMMA T.C. 4 SEC. PANCE 100 CPS	DENSITY T. C. — SEC. RANGE CPS	
	LITHOLOGY	STR IP	LOGGING SPEED 15 FT/MIN		
		S	LOGGED DEPTH 793 ft	LOGGED DEPTH	E 3
			200020 027711		
	Siltstone, light-brownish-gray to brownish-gray. 3 ft coal at 775				⁷⁵⁰ –230
	ft				7
	775				7
_	707 / T D		-		240
_	793 L.T.D.				800-
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_					850260
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_					950290
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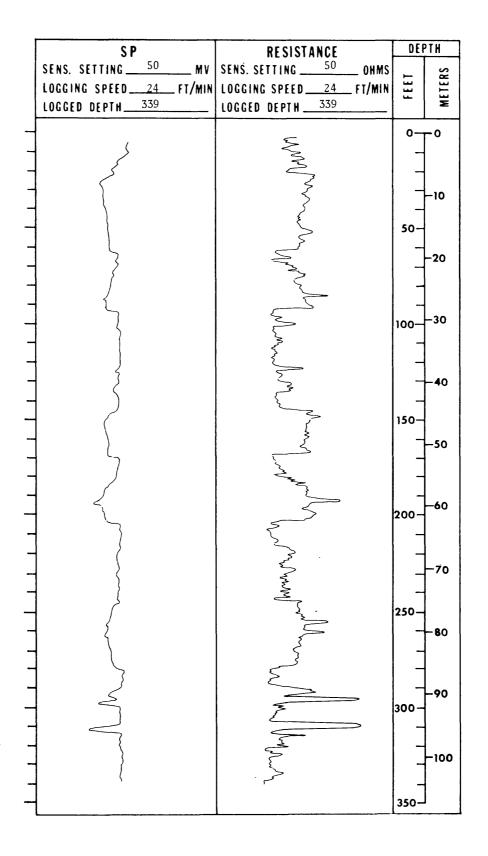
REMARKS: Log recorded 30 ft shallow

	SP	RESISTANCE	DEPTH	
	SENS. SETTING 50 MV LOGGING SPEED 25 FT/MIN	SENS. SETTING 100 OHMS LOGGING SPEED 25 FT/MIN	FEET	
	LOGGING SPEED 25 FT/MIN LOGGED DEPTH 480	LOGGING SPEED <u>25</u> FT/MIN LOGGED DEPTH <u>480</u>	FE MFT	
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	<u> </u>	Ž	350	

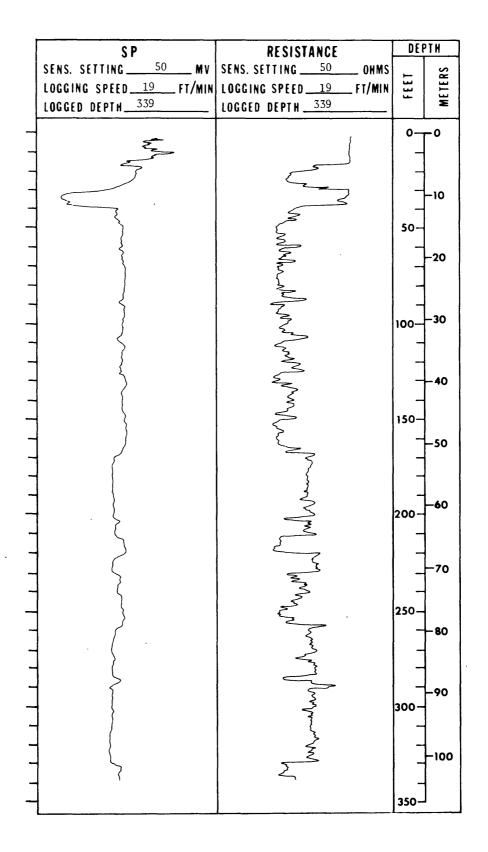
 $\begin{tabular}{ll} \textbf{REMARKS:} Log recorded 30 ft. shallow \\ \end{tabular}$



_						SHEE	T 1 OF 2
	AREA Southern Powder River Basin		QUAD NAM	Coal Dra	w (15 Minute)		
	DATE STARTED 9/29/77 DATE C	OMP.	9/29/77	COUNTY		ATE Wyoming	3
	LOCATION: SEC. 3 T. 39N , R. 73W	, F00	TAGE LOC.	1900 FSL	400 FEL	GROUND 49	920
	SIZE AND BIT TYPE: 4 3/4 inch Drag		ROT		TAGE CORING O	TOTAL DEPTH 3	40 ft
	DRILLING AGENCY: USGS - CD - NRMA		DRILL	TYPE: Port	adrill 524	DEPTH TO WATER 1.	4 ft
	LITHOLOGY RECORDED BY Hollomon, Coppoci	k, Rig	glin GEOPHYS	ICAL LOGS REC	ORDED BY L.D. I	Riglin	
	REMARKS:						
Ī			GAMN	1	DENSI	i	DEPTH
	LITHOLOGY	STR IP LOG			T. C SEC. RANG		FEET
		SI	LOGGING SPEED _ LOGGED DEPTH _		LOGGING SPEED LOGGED DEPTH	·	FE MET
╁	0		LOUGED DETTIN				0-0
4			***				
+	Sandstone, grayish-or to medium- gray, poorly sorted, very coarse		-				
\dashv	to very fine grained sand, sub- angular to sub-rounded quartz		-				-10
	grains weathered to 60 ft						-
			Now Mark				50-
-							-20
+							-
1	90		2	5			100 - 30
1	Claystone and sandstone, light- gray to brownish-gray, medium-		3				100 -30
4	grained to very fine grained sand, sub-rounded, carbonaceous						
\dashv				*		٠	-40
1	Sandstone, 1t-gray, poorly			3			
1	sorted, very coarse to very fine grained, sub-angular to rounded			-			150-
]	quartz sand 166		-	-			
$\frac{1}{2}$	Sandstone and siltstone, light- gray to light-brownish-gray,						
+	poorly sorted, coarse- to fine- grained sand, sub-angular		-				-60
1	202		€				200
	Sandstone and siltstone, light- gray, coarse-grained sand,						
┨.	angular			. •			-70
┨.	. 244		.\$				-
+	Sandstone, light-gray to brnish-						250 —
1	gray, poorly sorted, coarse- to fine-grained sand, sub-rounded		-				80
] :	279	·····	=]
4			£				-90
+	Sandstone and siltstone, light- gray to brownish-gray, poorly			<u> </u>			300-
\dashv	sorted, very coarse to very fine- grained sand, sub-angular.		=				-
1	Possible 2 ft coal at 295 ft and 4 ft coal at 308 ft						
	339 L.T.D.		-				
+			43				350
L		L			l		1

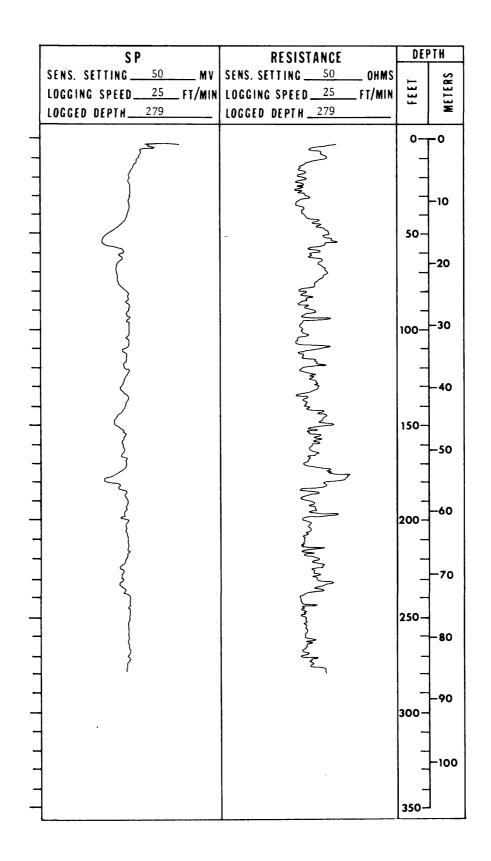


			 	SHEET 1 OF 2
AREA Southern Powder River Basin	1	QUAD NAME Coal Di	^aw	
DATE STARTED 9/30/77 DATE	TE COMP.	9/30/77 COUNTY (Converse STATE	Wyoming
LOCATION: SEC. 14 T. 40N , R. 7	3W , FOO	TAGE LOC. 925 FSL	150 FWL ELEV	ND 4910
SIZE AND BIT TYPE: 4 3/4 Dra	ıg	ROTARY 340	TAGE TOTA CORING O DEPT	
DRILLING AGENCY: U.S. Geologica		DOLLA TYPE		H TO
LITHOLOGY RECORDED BY Hollomon, Co				
REMARKS:	**			
	1	G A M M A	DENSITY	DEPTH
1.7.1101.004	ی ہے	T. C. 4 SEC RANGE CPS		
LITHOLOGY	STR IP LOG	LOGGING SPEED <u>17</u> FT/MIN	LOGGING SPEED	ET/WIN E
		LOGGED DEPTH 339 ft	LOGGED DEPTH	_
O Siltstone, grayish-orange to ligh	, ===			0-0
gray, weathered to 30 ft				
70 0 7		=		
30 Coal, brownish-black to black, vi 38 reous luster, conchoidal fracture	t-	5		10
_				50-
4		\$		
4				- 20
Siltstone, pale-yellowish-brown t	.0			-
light-gray, minor fine-grained sa	inds =====			-
7				10030
•				
				1 7 40
·		3		
4		4		150-
168			•	50
d '				
Sandstone, light-gray, coarse-to- fine-grained sand, sub-rounded gr	ains	3		
]				-60
212				200
Siltstone and sandstone, light-gr	ay	3	,	
to medium-gray, coarse-to medium- grained sand, sub-rounded		1		
4		3		
258				250-
1		3		-80
Sandstone and minor siltstones,				
light-gray to medium-gray, fine- grained to very fine grained sand				
, , , , , ,		-		300-
4		**		
4				
770		-		1 -100
339 L.T.D.				
†		45		350-



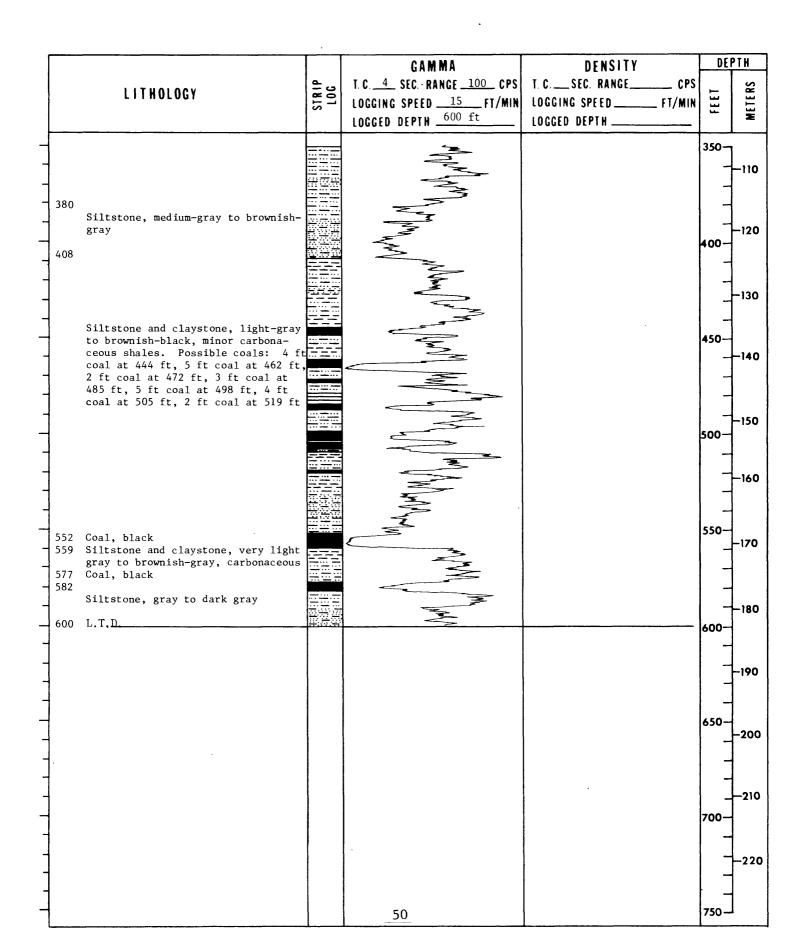
HOLE NO CD7701 SHEET 1 OF 2

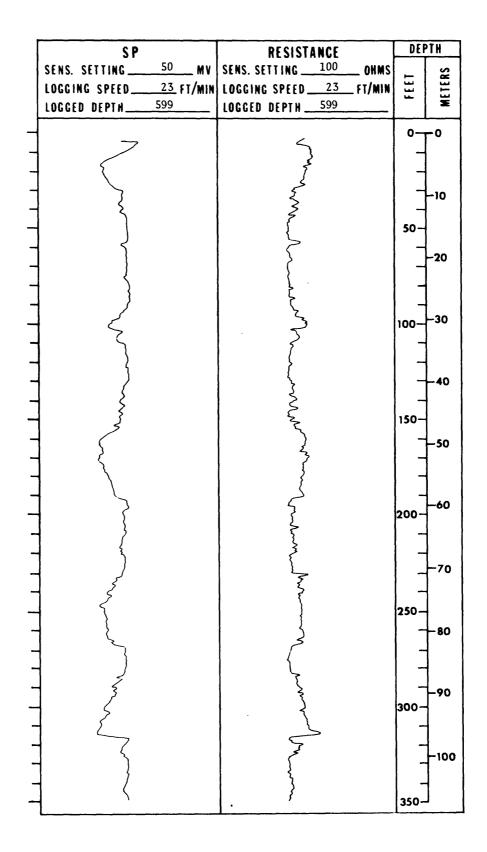
								SHEE	T 1 0	F 2
AREA So	outhern Powder River Basin		QU	AD NAME	Coal Bank	Draw 71				
DATE STAR	TED 10/3/77 DATE C	OMP.	10/3/	/77	COUNTY	Converse	ST	ATE Wyomin	12	
LOCATION:	SEC. 29 T. 40N, R. 69W	, F00			300 FNL	750	XIKIRL FWL	GROUND ELEV 46	1Qc	
	BIT TYPE: 4 3/4 inch Drag		-	ROTAR	FOO	TAGE CORING O		TOTAL	280	
DRILLING	7 3/4 Inch Dia			T	PE: Portad			DEPTH TO WATER		
	RECORDED BY Hollomon, Coppoci		lin	1	AL LOGS REC			Riglin	3.5	
REMARKS:								KIGIII.		
				GAMMA			DENSIT	γ	DEI	PTH
	17 HALAAV	ی _	T. C		E CPS			CPS		S
L	LITHOLOGY	STRIP LOG			17FT/MIN			FT/MIN	FEET	METERS
			LOGGE	D DEPTH _2	77	LOGGED D	EPTH			SE
0			I —————						ا∼	-0
	tstone and sandstone, pinkish-				_					
fine	y to light-brownish-gray, e-grained sand, carbonaceous			-	\$					
	Le, weathered to 25 ft								4	-10
46				3					50-	
	lstone, pinkish-gray to light- vnish-gray, medium-to fine-	= -		The state of the s					-	-20
	ined sand, sub-rounded			\leq						
] ' '										
-									100-	-30
-									-	
	tstone, sandy to claystone, cish-gray to brownish-gray,			3					-	
carb	ponaceous shale			2					-	-40
		====							150-	
4				3				•	_	-50
176 90 Can	l bearmich block								-	30
1/0-00 Coal	l, brownish-black								-	
]				3	• -				200-	-60
gray	estone and claystone, pinkish- y to brownish-gray, carbona-			4					200-	
ceou	is shale				3				-	
-				-					-	-70
238			1						-	
	stone and claystone, light- to brownish-gray, carbona-]	-					250 —	
1	is shale		1		3					⊢80
² // L.1.D									-	
1									-	-90
1									300-	
]									-	1
1										-100
-									_	
1				47					350~	J



NOLE NO CD77016

	UNII	LU) K L		TUKL 30	n 1 L I		SHE	ET 1 0	F 4
AR			Qu	IAD NAME	Coal	Bank Draw	7½'			
DA.	TE STARTED 10/3/77 DATE C	OMP.	10/4/7	7	COUNTY	Converse	ST	ATE Wyom	ing	
	CATION: SEC. 19 T. 40N, R. 69W	. F00			FNL 100 KSAK	1 -	O FWT	GROUND ELEV	4705	
	E AND DIT TUDE.				FOO	TAGE		TOTAL	600	
	7 9/ 1 22 98			ROTAR				DEPTH DEPTH TO		
	ILLING AGENCY: U.S. Geological St			DRILL TY		drill 524		WATER	surfa	ce_
	HOLOGY RECORDED BY Hollomon, Coppor	ck, Ri	glin_	GEOPHYSICA	IL LUGS REC	OKDED RA	L.I). Riglin		
KEI	MARKS:									
				GAMMA			DENSI	ГУ	DEF	PTH
	1.17.11.01.001	ا م	T. C4	SEC. RANGE	CPS	T. C. — SE		E CPS		S
	LITHOLOGY	STR IP LOG		IG SPEED				FT/MIN		METERS
			LOGGE	D DEPTH <u>600</u>) ft	LOGGED D	EPTH			Σ
0	Sandstone, yellowish-brown, very								0-7	-0
	fine grained to very coarse grained sand, sub-angular, poorly sorted,			Ž.					-	
25	weathered to 25 ft								1 4	
23	•	===							-	-10
				E	_					
					-				50-	
	Siltstone and sandstone, light-gray		-	3					1 -	-20
	to brownish-gray, very fine grained sand, trace of carbonaceous shale.			7					-	
	Possible 2 ft coal at 56 ft			\$	-				-	
									-	-30
		:::. :::							100-	30
	•				-					
		=====	ļ ·		- 5					-40
					-				_	- ·
150		=====		3					150-	
	Sandstone, 1t-gray to medium-gray,			5					_	 -50
	very fine grained to medium-grained sand, sub-angular particles			₹					_	
	Tana, Tanana Parana			\$					-	l
190		===		Z					-	
	Siltstone, light-gray to light-				-				200-	-60
	brownish-gray			3					-	
000				=						-70
232	•		1	3				•	-] ^
	Sandstone, light-gray to medium- gray, very fine grained sand								250-	
	Jane Started Sand		-						230-	80
268	Siltstone, medium-gray to brownish-			Zana					_	"
	gray, carbonaceous; claystone near top		:	**************************************	>				-	1
290	•			3					-	-90
	Sandstone, light-gray to light- brownish-gray, very fine grained		<	-					300-	· '`
316	sand, fining upward								-	1
	Siltstone, light-gray to medium-				-				-	Ĺ.,
	gray, carbonaceous		1						-	-10
			1	Samuel Samuel					-	1
		ļ	1	49					350-	J



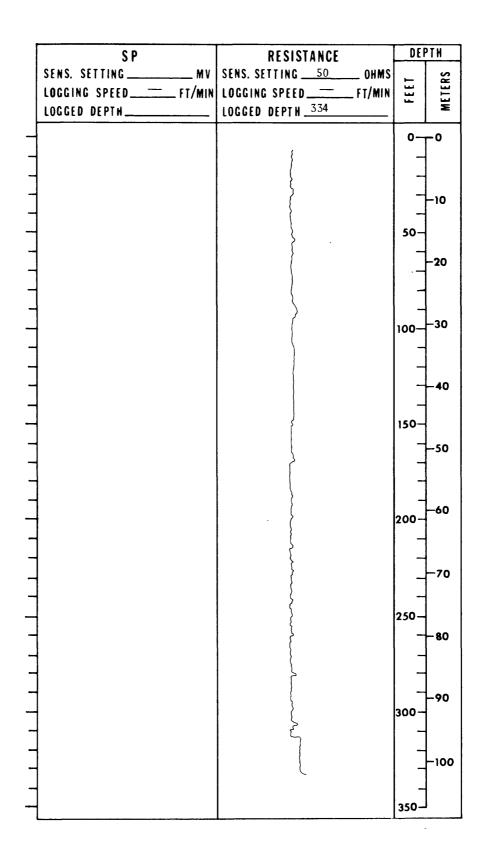


1	S P)	RESISTANCE	DEPTH	
	SENS. SETTING_	50 MV	SENS. SETTING 100 OHMS	_ _	2
	LOGGING SPEED_	FT/MIN	LOGGING SPEED 23 FT/MIN		MEIEKS
	LOGGED DEPTH_	599	LOGGED DEPTH 599	" 3	E
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AREA Southern Powder River Basin		QUAD NAME Teck		
DATE STARTED 10/12/77 DATE C	OMP.	10/16/77 COUNTY		ming
LOCATION: SEC. 10 T. 41N, R. 70 W	, F00T			25 ft
SIZE AND BIT TYPE: NX Diamond 4	3/4 Dra	g ROTARY 80	FOOTAGE TOTAL CORING 140 DEPTH 2	20
DRILLING AGENCY: U.S. Geological	1 Surve	y DRILL TYPE: Po	rtadrill 524 DEPTH TO WATER	
LITHOLOGY RECORDED BY Hollomon, Coppo				
REMARKS: Cored interval from 21	ft to	161 ft. Lost circulation		
			- 130 It	
		GAMMA	DENSITY	DEPTH
LITHOLOGY	ی _	T. C. 4 SEC. RANGE 100 C		
LITHOLOGY	STR IP LOG	LOGGING SPEED FT/N	1	FEET
		LOGGED DEPTH 213 ft.	LOGGED DEPTH	E
Sandstone, brown, medium to fine-	75.57.5			0—0
grained, weathered		¥		-
25		~		
		want begin to the second of th		
		3		50-
-		₹		-
Siltstone, brown to red-brown, possibly baked; claystone from 25 ft		*		
to 35 ft and from 73 ft to 82 ft		-		-
				30
		*		100-30
		- Park		40
143				
Coal, black		٤		150-
				-50
Siltstone, gray, with thin claystone and carbonaceous shale interbeds.		3		
Thin coal from 169 ft to 172 ft		3]
				200-60
213 L.T.D		3		
1				-
				70
1				
				250
1				80
1				-90
				300-
1 ·				-
				-100
-		53		350
				1

						SHEE	T 1 OF 3
AR	Southern Powder River Basin		QUAD NAM	E Coal D	raw		
DA	TE STARTED 10/18/77 DATE C	OMP.	10/18/77	COUNTY	Converse ST	ATE Wyomin	ng
LO	CATION: SEC. 29 T. 41N, R. 72W	, F00	TAGE LOC.	1700 fil	7 FEL 2100 FWL	GROUND ELEV 4	765
SI	ZE AND BIT TYPE: 4 3/4 Drag		RDT	FDC ARY 640	TAGE CORING O	TOTAL DEPTH (540
DR	ILLING AGENCY: U.S. Geological	Survey		TYPE: Portac		DEPTH TO	GL
LIT	HOLOGY RECORDED BY Ed Fivas			ICAL LOGS REC		Mountain Log	
RE	MARKS: Not logged below 334	ft.	Lithology based o	on unlagged sa	amples only.		
	-		C.		•		
			GAMN	A A	DENSIT	ГҮ	DEPTH
	LITHOLOGY	STR 1P LOG	T. C. <u>1</u> SEC RAN				T. RS
		SI	LOGGING SPEED LOGGED DEPTH		LOGGING SPEED LOGGED DEPTH	FT/MIN 334 ft	FEET METERS
			LUGGED DEPIN _	334	LOGGED DEPIN		
] `			})		°T°
1	Sandstone, yellowish-brown, medium-		{		}		
$\left\{ \right.$	grained, angular to sub-angular		}		J		10
1	grains		}		4		-
1			}		}		50-
64			4				20
	Sandy siltstone, gray				4		
88 92	Coal Coal		2		\ \	•	-
108	Siltstone, gray		کم				10030
1 ***		77	{				-
	Com lot on a super super liver super 1		}				40
-	Sandstone, gray, medium-grained, sub-angular		{				
148			}		}		150-
1			}				-50
]			Ş				
			}				
			}				20060
1	Sandy siltstone, gray, with 3 ft		<u> </u>		-		-
	coal at 171 ft, possible 1 ft coal		کم		}		
	at 227 ft		}				70
			Ş				250-
1			\$				80
1			}				-
1			- Z				-
			}				300-
1			5				
315							-
1	Coal		,		1		-100
350			<i></i>				350
1 220			54		1		350-7

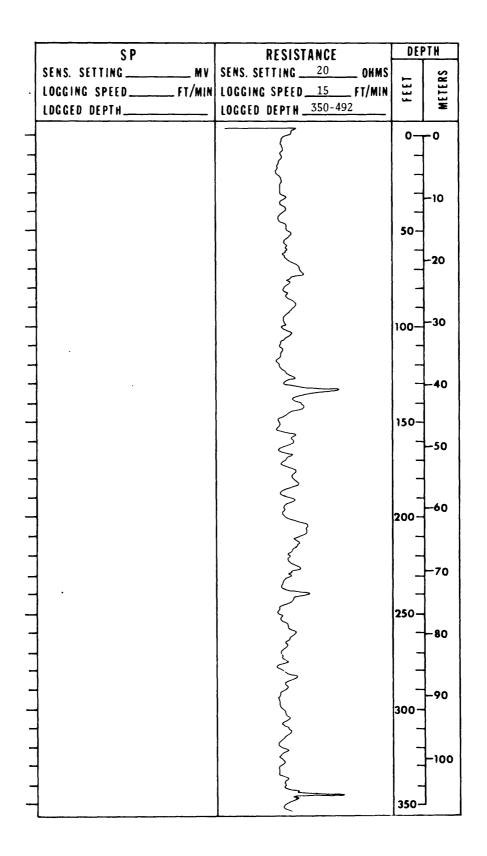
		G A M M A	DENSITY	DEPT
	ا ــ ــ	T. C SEC. · RANGE CPS	T. CSEC. RANGE CPS	
LITHOLOGY	STR IP LOG	LOGGING SPEEDFT/MIN		133
	S	LOGGED DEPTH	LOGGED DEPTH	=
		LUGGED DEFIN	LUGGED DEFIN	ļL
350				350-
				-
				7
				▎▔⊢
				400-
				-
				1 4
Cidadan last sa	====			l _→
Siltstone, dark-gray	=====			1 7
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Siltstone and possible coal	=====			-
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40 L.T.D <u>.</u>				
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HOLE NO CD77019 SHEET 1 OF 4

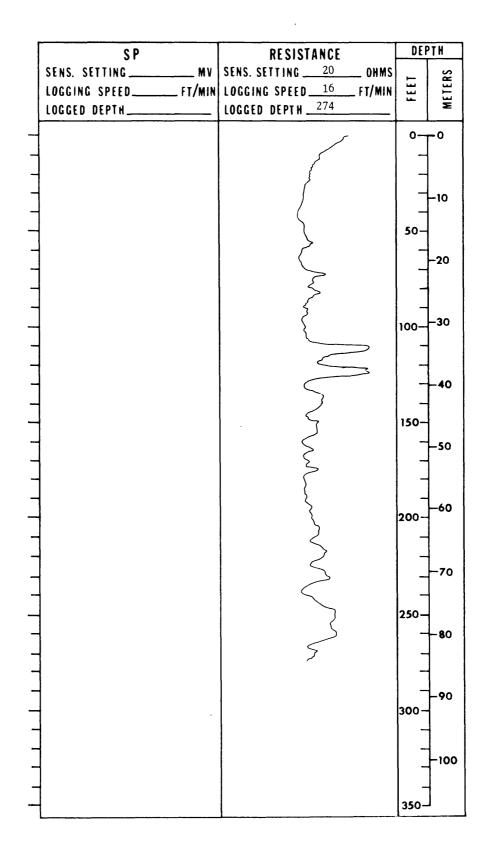
A	REA Southern Powder River Basin		QUAD NAME Betty Reservoir						
DA	ATE STARTED 10/19/77 DATE (OMP.	10/19/77 COUNTY	Converse STATE Wyomi	ng				
LO	OCATION: SEC. 6 T. 39N, R. 70W	, FOOT	AGE LOC. 950 KSt	Z 1200 FEL ELEV 4	840				
SI	ZE AND BIT TYPE: 4 3/4 Drag		ROTARY 500	DOTAGE TOTAL CORING O DEPTH 50	0				
DI	DRILLING AGENCY: USGS - CD - NRMA DRILL TYPE: Portadrill 524 WATER Land Surface								
	LITHOLOGY RECORDED BY Hollomon, Coppock, Fivas GEOPHYSICAL LOGS RECORDED BY F.B. Kistner								
Kt	Geophysical logs poor.	Litholo	ogy from field logs and sam	ples.					
-			GAMMA	DENSITY	DEPTH				
}	LITHOLOGY	ی ہے	T. C. 4 SEC RANGE 50(?) CP						
	LITHOLOGY	STR 1P LOG	LOGGING SPEED 15 FT/MI	1	FEET				
-		\vdash	LOGGED DEPTH 493 ft	LOGGED DEPTH	 				
0	Sltst and Claystone, grayish-or				· • T •				
\downarrow	to grayish brn, weathered to 30 ft		کے						
31			}		10				
]			}		50-				
1	Sandstone, lt-gray, vf grained		\frac{1}{2}						
1			{		20				
85	Coal and carb sh, brnish-black, conch frac, dull to vit luster		}						
90			Z		100 -30				
-	Sdy sltst and claystone, v lt gray to lt brnish gray		{						
132	Coal and carb sh, blk to brnish-		}		1 -40				
136		====	5						
1	Sdy slst and claystone, lt-gray to brnish-gray		3		150-				
]	to british gray		5		-50				
180			}]				
1	Ss, lt-gry, v f grained, sub- angular		.}		-60				
200	Carb sh and sdy sh, lt gray to		}		200				
220	brnish gray		Z						
1			₹,		70				
]	Sdy sh, lt-gray to brnish-gray		\$		250				
1			<		250 80				
1		昌	<u>}</u>		-				
280	Carb sh and sdy sh, lt-gray to brnish-gray								
300			>		300-				
1	Sdy sh, carb sh, v 1t gray to brnish-gray		>		-				
1	nrutau-Rr da		\leq						
-			3						
1			57 <		350				

		,	GAMMA	DENCITY	DEP	TH
			T. C. <u>4</u> SEC RANGE <u>50</u> CPS	DENSITY T. CSEC.: RANGE CPS		
	LITHOLOGY	STR IP LOG			FEET	METERS
		IS 1	LOGGING SPEED <u>15</u> FT/MIN		E	MET
			LOGGED DEPTH 493 ft	LOGGED DEPTH		
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_	Sdy sh, carb sh, v 1t gray to brnish-		>		400-	-120
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-	493 L.T.D.				-	-150
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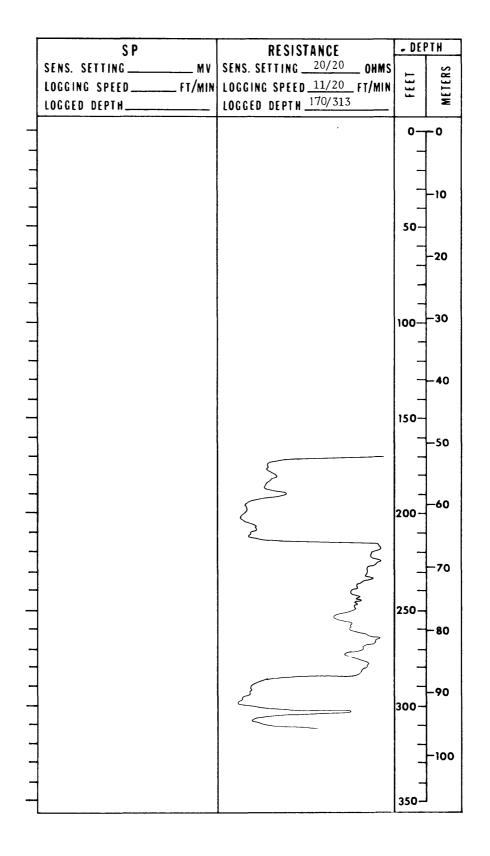


1	SP	RESISTANCE	DEP	TH
	SENS. SETTINGMV	SENS. SETTING <u>20</u> OHMS		RS
	LOGGING SPEEDFT/MIN		FEE	METERS
	LOGGED DEPTH	LOGGED DEPTH 350-492		Σ
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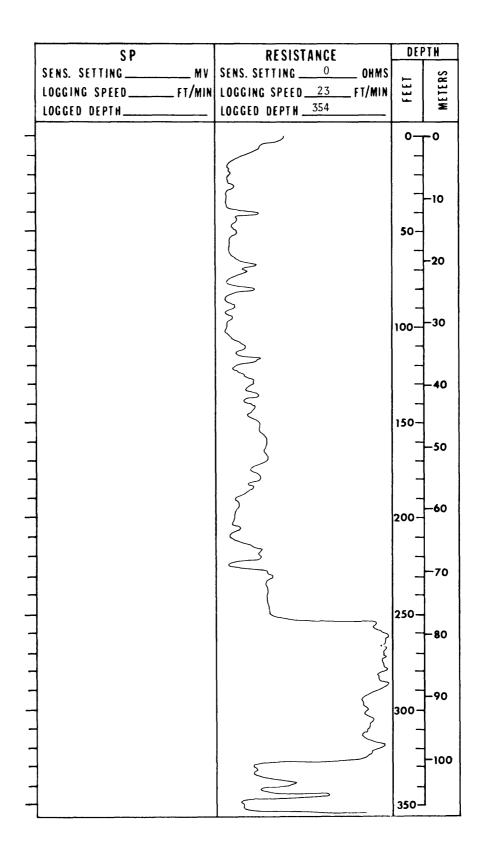
AREA Southern Powder River Basin	QUAD NAME Betty Reservoir							
DATE STARTED 10/20/77 DATE C	DATE STARTED 10/20/77 DATE COMP.			E Wyomi	ng			
LOCATION: SEC. 22 T. 40N, R. 70W	, FOOTA		1150 FWL E	ROUND LEV 48	70			
SIZE AND BIT TYPE: 4 3/4 Drag		FOOTAGE TOTAL ROTARY 280 CORING O DEPTH			80			
DRILLING AGENCY: U.S. Geological St	ırvey	DRILL TYPE: Porta	dri11 524	DEPTH TO WATER	LS			
LITHOLOGY RECORDED BY Hollomon, Coppoci	k, Fivas	GEOPHYSICAL LOGS REC	ORDED BY F.B. K	istner				
REMARKS: Ground level at base of burn								
LITHOLOGY	ST 01	GAMMA T.C. 4 SEC. RANGE 10(?) CPS LOGGING SPEED 18 FT/MIN LOGGED DEPTH 275	DENSITY T.CSEC.RANGE_ LOGGING SPEED LOGGED DEPTH	FT/MIN	FEET REET WEET WAS A STATE OF THE STATE OF T			
Siltstone, dk-gy to dk-yellowisn brown, sandy, very fine, sub-angular sand, minor amounts of black shale. Possible 2 ft coal at 19 ft and 1.5 ft coal at 59 ft Claystone and sdy sltst, m-lt-gray, approx. 20% carb sh, thin coal at 74 ft 111 Coal, dk-brn to black, dull luster, avg frag size of 0.4 cm; with dark gray siltstone parting from 117-122 ft Siltstone, dark-gray, with less than 5 percent fine-grained sand, minor amounts of carbonaceous shale. Possible 3 ft coal at 176 ft 275 L.T.D.		Many Many Many Many Many Many Many Many			0-0 -10 50- -20 -20 -40 -50 50 70 80 90			
		61			350			



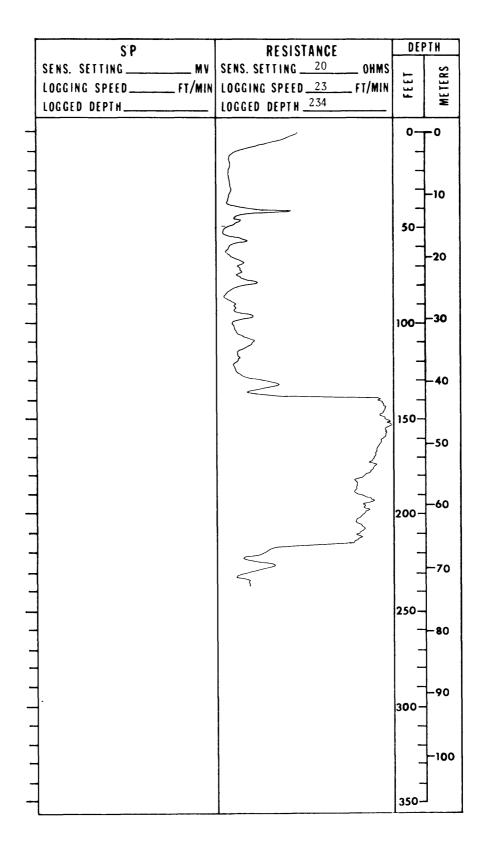
A	REA Southern Powder River Basin		QUI	AD NAME	Teck1a					
D	ATE STARTED 10/29/77 DATE C	OMP.	10/29/7	77 C	OUNTY	Campbell		ATE	Wyomir	ıg
L	OCATION: SEC. 34 T. 42N , R. 70W	, F00	TAGE LO	C.	26 FSL	50	fet fwl	GROUND ELEV	4850	
S	IZE AND BIT TYPE: 4 3/4 Drag			ROTARY	FOD 318	TAGE CDRING O		TOTAL DEPTH	318	
D	RILLING AGENCY: U.S. Geological Sur	rvey		DRILL TYP	E: Porta	dri11 524		DEPTH 1 WATER	169'	
ì	ITHOLOGY RECORDED BY Hollomon, Coppoc		ras	GEOPHYSICA	LOGS REC	ORDED BY (G. Hol	lomon_		
R	EMARKS: USFS SEAM 9A									
			70 4	GAMMA	10(3)000		ENSI		<u></u>	DEPTH
1	LITHOLOGY	STR 1P LOG		_ SEC.·RANGE . 3 SPEED <u> </u>		T. C. — SEC. LOGGING SP			MIN	METERS
		S			3 ft	LOGGED DEP				E
10	Siltstone and sandstone, yellow,									00
$\begin{vmatrix} \\ \\ 11 \end{vmatrix}$	weathered to 15 ft				7				1	
	Sandstone, grayish-brown, medium-to		•	May have been a second						4
1	fine-grained sand, poorly sorted									-10
1				2	}					4
48	1								!	50-
	Sandstone and claystone, yellowish-				>					-20
]	brown to light-gray, medium-grained to very fine grained sand, carbo-			•	\$]
1	naceous				> >					
10	0				- 3				10	10 - 30
1				•						-
-					5					4
1	Consistency well wellowigh house to				5					+40
1	Sandstone, pale-yellowish-brown to medium-gray; siltstone, light-gray			2	~					_ =
1	to light-brownish-gray, siderite concretions at 160 ft and 190 ft			-	\leq				13	50-
					3					
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1									20	00
21	3	====			*					+
1	Coal, brownish-black, dull to vit-		}							
	reous luster, fragmental		\ \{\frac{1}{2}}]~
			ranged Mangelange						20	50-
-			\[\sigma_{\sigma} \]						23	80
-			3							4
_ ا			5							4
28	Siltstone and claystone, light-				-					-90
1	brownish-gray to brownish-black, carbonaceous, possible 4 ft coal at		-		3				30	00-
]	302 ft		 							7
3:	13 L.T.D./									100
1			'	63					3	50



AREA Southern Powder River Basin		QUA	DNAME		Teckla			
DATE STARTED 10/30/77 DATE C	10/30/	₇₇ C	AUNTY		TATE Wyomi	ng		
LOCATION: SEC. 33 T. 42N , R. 70W	, F001			27 FSL	37 FWL	GROUND ELEV 480	5	
SIZE AND BIT TYPE: 4 3/4 Drag.			ROTARY	FOC	OTAGE CORING O	TOTAL DEPTH 36	0	
DRILLING AGENCY: U.S. Geological	Survey		DRILL TYP	E: Porta	drill 524	DEPTH TD WATER	LS	
LITHOLOGY RECORDED BY Hollomon, Coppock, Fivas GEOPHYSICAL LOGS RECORDED BY G. Hollomon								
REMARKS: Technically poor gamma 10	na due	to recor	der drive m	alfametion				
Lithology from samples 1:	agged t	o resist	ance log. US	SFS SEAM 1	1A;			
			GAMMA		DENSI		DEPTH	
LITHOLOGY	STR 1P LOG		. SEC.·RANGE . 				FEET METERS	
	S		DEPTH		LOGGED DEPTH	-	AET FE	
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							-	
							-10	
							50-	
							-20	
							-	
Sandstone, moderate-yellowish-brown to light-brownish-gray, weathered to							100 - 30	
34 ft; siltstone and claystone, light-gray to brownish-black, medium-grained to very fine grained sand.								
grained to very fine grained sand, sub-angular to sub-rounded grains,							-	
carbonaceous zones							40	
							150-	
							50	
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			•				20060	
							_ -70	
							250	
259							250 80	
Coal, dark-brown to black, dull to							-	
vitreous luster, fragmental		ŀ					-90	
							300-	
Siltstone and sandstone, medium- light-gray to brownish-black, fine-							-100	
grained sand, carbonaceous 353 L.T.D.		_65	5				350	

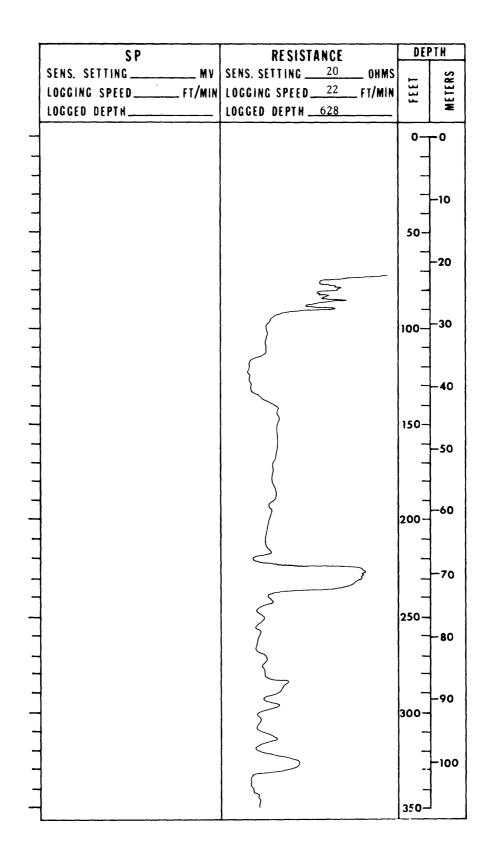


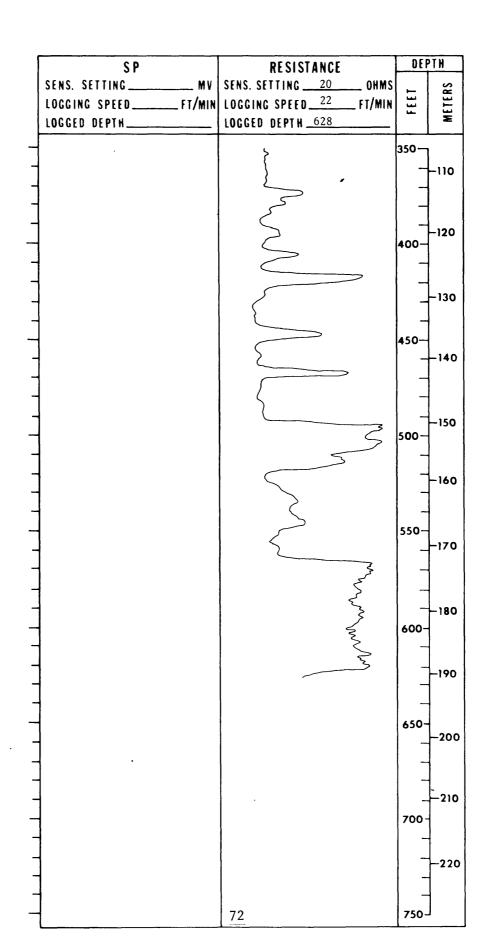
ADCA		01140 1151							
AREA Southern Powder River Basin		QUAD NAM	1						
DATE STARTED 10/31/77 DATE C		10/31/77		Campbell ST	ATE Wyomin	ng			
LOCATION: SEC. 33 T. 42N, R. 70W	, F00T	AGE LOC.	200 FSL	2000 FWL	ELEV 4	1740			
SIZE AND BIT TYPE: 4 3/4 Drag		RD	TARY 240	TAGE CORING O		240			
DRILLING AGENCY: U.S. Geological S	urvey	DRILL	TYPE: Portad	lri11 524	DEPTH TO WATER	L.S.			
LITHOLOGY RECORDED BY Hollomon, Coppos	LITHOLOGY RECORDED BY Hollomon, Coppock, Fives GEOPHYSICAL LOGS RECORDED BY G. A. Hollomen								
REMARKS: USFS SEAM 3N									
		GAM		DENSI		DEPTH			
LITHOLOGY	STR IP			T. C SEC. RANG	1	FEET METERS			
	2	LOGGING SPEED . LOGGED DEPTH .		LOGGING SPEED LOGGED DEPTH		HE FE			
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Siltstone and sandstone, yellowish- brown to greenish-gray. Surface			Z			50-			
weathered to 25 ft. Possible 3 ft coal at 42 ft			3			-20			
Coar at 42 It			M						
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Cool block		5							
Coal, black		E			A				
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Silty sandstone						-[
234 L.T.D	F								
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						80			
1						-			
						-90			
1		·				300-			
						_100			
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1		67				350			



A	REA Southern Powder River Basin		QUAD NAME Little Thunder Reservoir								
D/	ATE STARTED 11/2/77 DATE C	OMP.									
L	OCATION: SEC. 7 T. 43N , R. 71W	, F00			350						
S	ZE AND BIT TYPE: 4 3/4 Drag		ROTARY 700	TAGE TOTAL CORING O DEPTH TO	700						
DI	RILLING AGENCY: U.S. Geological S	Survey	DRILL TYPE: Por	25 ft							
LITHOLOGY RECORDED BY Hollomon, Coppock, Fivas GEOPHYSICAL LOGS RECORDED BY G.A. Hollomon											
"	REMARKS: Gamma logged through drill rods.										
			GAMMA	DENSITY	DEPTH						
	LITHOLOGY	STR IP LOG	T.C. 4 SEC. RANGE 100(?)CPS LOGGING SPEED 21 FT/MIN LOGGED DEPTH 665 ft.	T. C. <u>1</u> SEC. RANGE <u>25 K</u> CPS LOGGING SPEED <u>20</u> FT/MIN LOGGED DEPTH <u>390 ft</u>	. – . – .						
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			Cy-	3							
-	Sandstone, grayish-orange to medium- gray, coarse- to fine-grained sand,		ح کے	~	10						
1	sub-angular, weathered to 40 ft		Sarch a	\	50-						
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$\begin{vmatrix} 11^{2} \\ 130 \end{vmatrix}$	Siltstone, medium-light-gray			}	-						
] 1.50	,		2	}	-40						
			Service of the servic	\$	150-						
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]	Sandstone, medium-light-gray to lt- brownish-gray, coarse- to fine-grnd		**	{							
4	sand			}							
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222	Coal, black		2		70						
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4					"						
	Siltstone, light-gray to brownish-										
]	black, sandstone, light-gray to lt- brownish-gray, medium- to fine-grad			Sw.	-90 300-						
4	sand ·		The state of the s	3	-						
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\dashv		<u> </u>	69	کے	350						

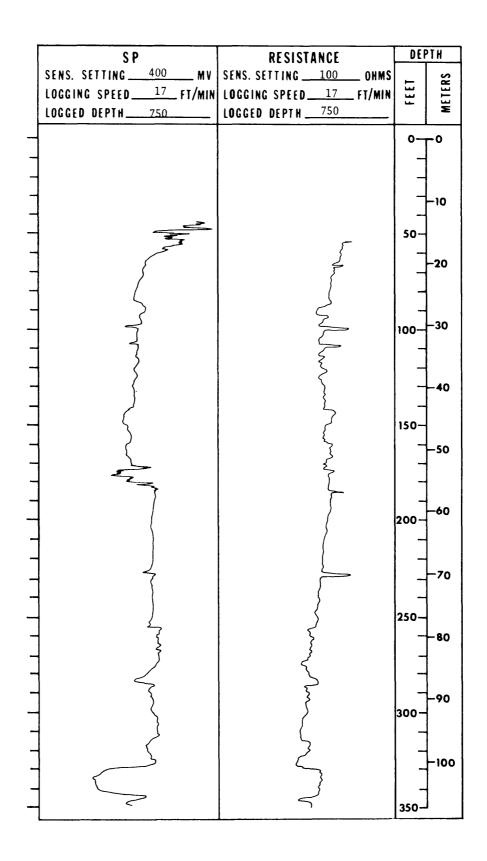
		d (3	GAMMA T.C. 4 SEC. RANGE 100(?) CPS	DENSITY T. C. 1 SEC. RANGE 25 KCPS	DEPT	
	LITHOLOGY	STRIP	LOGGING SPEED <u>21</u> FT/MIN LOGGED DEPTH <u>665</u> ft	LOGGING SPEED 20 FT/MIN LOGGED DEPTH 390 ft	1334	METERS
-	Siltstone, light-gray to brownish- black, sandstone, light-gray to lt- brownish-gray, medium- to fine- grained sand		Lynnamy V Wyddian	Juny my		110
	413 Carbonaceous shale, brownish-black 420					30
	Siltstone and sandstone, light-gray, poorly sorted		A A A A A A A A A A A A A A A A A A A		450	140
1 1 1	Coal and carbonaceous shale, brnish- black coal (492-508 ft), carb shale (508-517 ft)				500-	160
1 1 1	Siltstone and sandstone, medium-gray to light-gray, fine-grained sand 564		The state of the s		550-	70
	Coal, brownish-black to black		74-71-71-71-71-71-71-71-71-71-71-71-71-71-		600-	180
	625 Siltstone, medium-gray				650-	200
-	665 LTD					210
-					700-	220
			70		750	





				[1] UF 4
AREA Southern Powder River Basin		QUAD NAME Little	Thunder Reservoir	
DATE STARTED 11/11/77 DATE	COMP.		Campbell STATE Wyomi	ng
LOCATION: SEC. 7 T. 43N , R. 71W	, FOOT	AGE LOC. 100 FNL	TOO INC LLLV	4900
SIZE AND BIT TYPE: 4 3/4 Ken-cla	I W	RDTARY 800	DTAGE TOTAL CORING O DEPTH	800
DRILLING AGENCY: U.S. Geological	Survey	DRILL TYPE: Port	tadrill 524 DEPTH TD WATER	27 ft
LITHOLOGY RECORDED BY Hollomon, Coppo				
REMARKS:				
	T	G A M M A	DENSITY	DEPTH
LITHOLOGY	ای ـے		T. C SEC RANGE CPS	L S
LITHOLOGY	STRIP	LOGGING SPEED <u>20</u> FT/MIN		FEET
		LOGGED DEPTH 75 ft	LOGGED DEPTH	*
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Sandstone, dark-yellowish-orange to light-gray, very coarse grained to		3		
fine-grained sand, sub-rounded to angular, weathered to 35 ft		5-50]-10
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65		}		30
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Siltstone, light-brownish-gray to m-		~		
light-graý, fíne sand below 140 ft				-40
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Sandstone, light-gray to medium-light		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		200-60
gray, very coarse grained to fine- grained sand, sub-rounded to angular		E		
granica said, sas rodices to digutar		3		
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]				80
Siltstone, medium-gray to light-				
brownish-gray, possible 4 ft coal at		2		-90
279 ft				300-
1				-
1		23		-100
³³⁰ Coal, black, vitreous luster, conch fracture, carb shale, brnish-gray to		\		
brownish-black	== ::= ==	73 2		350
345	1	<u> </u>	1	1

1				CAMMA	DENCITY	DF	PTH
			اما	GAMMA T. C. 4 SEC RANGE 10 _ CPS	DENSITY T. CSEC. RANGE CPS	"	
		LITHOLOGY	STR IP LOG	1. U SEU- RANGE UPS	LOCCING CREED CT/MIN	FEET	E RS
			2 -	LOGGING SPEED 20 FT/MIN LOGGED DEPTH 75 ft	LOGGING SPEED FT/MIN LOGGED DEPTH	35	METERS
					LUGGED DEFIN		L
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_		Siltstone and carbonaceous shale,					-130
-		light-gray to blackish-brown		\$		_	
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4				S		_	-140
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4		3 ft coal at 478 ft				_	
4							
\perp						500-	-150
				John		500	
				No.			
	528		=====				-160
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				{			
				\geq		550-	-170
				}			
				>			
٦		Coal and carbonaceous shale, brnish-		}		-	
٦		black to black, dull luster, crumbly				-	-180
				{		600-	
٦				>		-	
1				{		-	-190
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7		Siltstone and sandstone		3		700-	
1						-	
4						-	-220
1						-	
1		L.T.D		74		-	
4		L. 1. D.		<u></u>		750-	
ι					L	L	



-	SP	RESISTANCE	DEPTH
	SENS. SETTING 400 MV	SENS. SETTING 100 OHMS	ERS
	LOGGING SPEED <u>17</u> FT/MIN LOGGED DEPTH <u>750</u>	LOGGING SPEED <u>17</u> FT/MIN Logged Depth <u>750</u>	FEET METERS
	COUNTY DEFIN	LUGGED DEFIN	L
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_	1	76	750

								EI 10	4
AREA Southern Powder River Basin	QU	QUAD NAME Little Thunder Reservoir							
DATE STARTED 11/13/77 DATE	11/1	.3/77	COUNTY C	ampbe11			oming		
LOCATION: SEC. 24 T. 43N , R. 72W	TAGE LO	GE LOC. 2550 FNL FEL 2550 ENE 2550 ENE				87a			
SIZE AND BIT TYPE: 4 3/4 Drag		ROTA	RY 725	TAGE CORING O		TOTAL DEPTH 725			
DRILLING AGENCY: II. S. Geological	Survey		DRILL T	YPE: Port	adrill 524		DEPTH TO WATER	43 ft	
LITHOLOGY RECORDED BY Hollomon, Coppe	ck, Fiv	as	GEOPHYSI	CAL LOGS REC	ORDED BY	F.B.	Kistner		
REMARKS: Gamma logged throu	ıgh dri]	ll rods.							
	+							- 	
	_	Tr 4	GAMM SEC. DAN	A GE $\frac{10}{}$ CPS		ENSIT	[Y : CP		PTH
LITHOLOGY	STR IP LOG						FT/MI	_	METERS
			D DEPTH _		LOGGED DEI	PTH <u>—</u>			¥
- 0	===		•					0-	Lo
Sandstone, dark-yellowish-orange to medium-gray, coarse- to medium-			3					-	
grained sand, sub-rounded, weathered to 60 ft	1		<i></i>] ,
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Siltstone and claystone, light-gray to dark-gray								-	
								100-	-30
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130				?				-	-40
Sandstone, light-gray to medium-			<i>ξ</i>					-	1
dark-gray, very coarse grained to medium-grained sand, sub-rounded			3					150-	
-			3					_	-50
187 Coal, brownish-black to black, vit			2	>				-	1
lustér, conchoidal fracture		5						-	-60
1			٤	> 3				200-	}
-			3					-	1
Siltstone, light-gray to medium-			5					-	- 70
dark-gray			~ ~	•				250 -	1
4				-				_	80
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285			<u> </u>	3				-	1
1]	\$					300-	90
			Ş					_	-
Sandstone, light-gray to medium- dark-gray, coarse- to fine-grained			€ No.					-	-100
sand			77]
-			5 77					350-	J

	LITHOLOGY	STR IP LOG	GAMMA T.C4_SECRANGE10(?)CPS LOGGING SPEED20FT/MIN LOGGED DEPTH714_ft	DENSITY T.CSEC.:RANGECPS LOGGING SPEEDFT/MIN LOGGED DEPTH	DEPTI	METERS =
	Siltstone and claystone, light-gray to medium-gray, w/carbonaceous shale, brownish-black		My Mondey for the second of th		450- 	20 30 40 50 70
1 1 1 1 1 1 1	Coal, brownish-black to black, dull luster, friable				650-	200
	704 Siltstone, light-gray 714 L.T.D.		78		700-	220

REMARKS: Log is composite of two runs

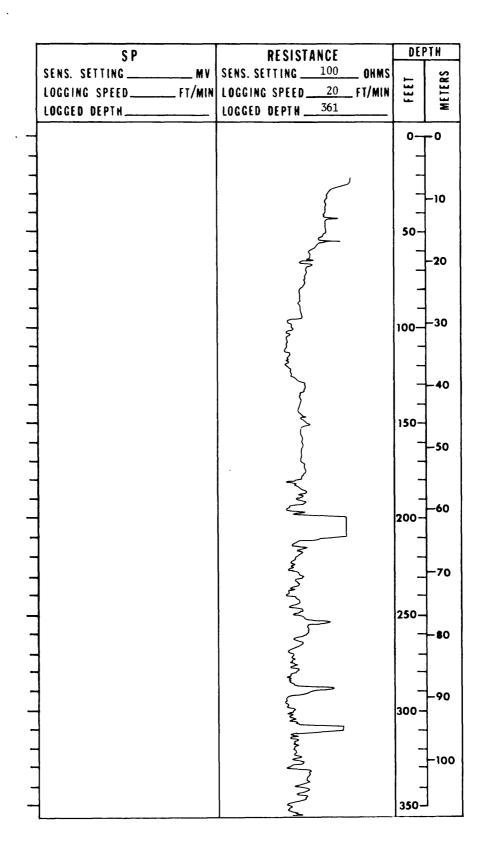
1	S P	RESISTANCE	DEF	TH
	SENS. SETTING 100/400 MV	SENS. SETTING 50/100 OHMS	<u></u>	S
	LOGGING SPEED 26/24 FT/MIN	LOGGING SPEED <u>26/24</u> FT/MIN	FEET	METERS
	LOGGED DEPTH 250/683	LOGGED DEPTH250/683		Σ
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REMARKS: Log is composite of two runs

ſ	S P	RESISTANCE	DEF	TH
	SENS. SETTING 100/400 MV	SENS. SETTING <u>100/400</u> OHMS	1	RS
l	LOGGING SPEED <u>26/24</u> FT/MIN	LOGGING SPEED <u>26/24</u> FT/MIN	FEE	METERS
	LOGGED DEPTH 250/683	LOGGED DEPTH 250/683		Σ
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		80	750-	J

					SHEE	T 1 OF 4
AREA Southern Powder River Basin		QU	AD NAME Little Th	nunder Reservoir		
DATE STARTED 11/14/77 DATE (MIDUCIL	ATE Wyomi	ng		
LOCATION: SEC. 13 T. 43N, R. 72W	TAGE L	OC. 600 FNL	FEL 300 ≠₩ ±	GROUND ELEV 483	35	
SIZE AND BIT TYPE: 4 3/4 Drag			ROTARY 600	TAGE CORING O	TOTAL DEPTH 60	00
DRILLING AGENCY: II. S. Geological S	urvev		DRILL TYPE: Port	adrill 524	DEPTH TO WATER	18 ft
LITHOLOGY RECORDED BY Hollomon, Coppoc	k, Fiv	as	GEOPHYSICAL LOGS REC		Kistner	
REMARKS:	-					
Gamma logged thru d	rill ro	ods				
			G A M M A	DENSIT	·Y	DEPTH
LITHOLOGY	STR IP LOG		_ SEC. RANGE 10 _ CPS			ERS
	SI		IG SPEED <u>16</u> FT/MIN D DEPTH <u>588 ft</u>	LOGGING SPEED LOGGED DEPTH	20 FT/MIN 361 Ft	FEET METERS
0		LUGUE	J VEFT II	LOUGED DEFIN		00
12 Sandy, silty, brown, med						l "T"
4			{			_
Sandstone, dark-yellowish-orange to light-gray, coarse- to fine-grained			}	{		10
sand, sub-angular to sub-rounded, weathered to 35 ft			7	>		
weathered to 35 It			4	2	-	50-
<u> </u>			}	<u>}</u>		-20
4			A A	}		
- 95			E	Ś		-
Siltstone and claystone, light-gray to brownish-gray			£ 3	\geq		10030
123			p s	No.		
			\$ P 3	5 3		40
Sandstone, light-gray, very coarse			\frac{1}{5}	\$	•	
grained to medium-grained sand, sub-			4	3		150-
angular			}	}		-50
			Z	{		
-			1	5		
197 Coal, brmish-blk to blk, vit luster, conch frac, fragal, carb sh, brmish-			5	5		20060
210 gray			3	}		
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4]		
4		1	<i>\$</i>	}		250-
4			3	3		80
Sandstone, light-gray; siltstone,			3	}	?	-
medium-light-gray to dark-gray, f- grained sand		1		{	, >	
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		I	81_,*		·	350-

		LITHOLOGY	STR IP LOG	GAMMA T.C. 4 SEC. RANGE 10 CPS LOGGING SPEED 16 FT/MIN LDGGED DEPTH 588 Ft	DENSITY T.C1_SEC_RANGE25KCPS LOGGING SPEED20FT/MIN LDGGED_DEPTH361_Ft		METERS
		Sandstone, light-gray, siltstone, medium-light-gray to dark-gray, fine-grained sand		AN SOLVE AND AND AND AND AND AND AND AND AND AND		350-	-110
	403 424	Coal (403-415 ft), black, vitreous luster, conchoidal fracture, frag carbonaceous shale (415-424 ft), brn				400-	-120 -130
		Sandstone and siltstone, light-gray to medium-gray, fine-grained to very fine grained sand				450 	-140
	496	Coal, brownish-black to black, crumbly		Mark Commonweal Common		500 	-150 -160
	550	Siltstone and carbonaceous shale, light-brownish-gray to brownish-black		Samerand Market by the		 550 	-170
1 1 1 1	588	L.T.D.		Land		600-	-180
1 1 1						650-	-190 -200
						700-	-210
1 1 1				82		750	-220



	SF)	RESISTANCE	DEP	TH
	SENS. SETTING_	400 MV	SENS. SETTING OHMS		SS
	LOGGING SPEED_			FEE	METERS
	LOGGED DEPTH_	592	LOGGED DEPTH 592		E
-			ž,	350 —	
4			2	4	-110
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-				-	-120
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_]		84	750	
_	1			750-	

ſ	A	REA Southern Powder River Basin		01	IAD NAME	Little Th	under Resen	woi r			
r	DATE STARTED 11/15/77 DATE COMP. 11/1			<u> </u>			Campbell		ATE Wyomir	10	
ļ		OCATION: SEC. 12 T. 43N., R. 72W.				1300 FSL		fft FWL	GROUNG	360 ft	
		ZE AND BIT TYPE: 4 3/4 Ken-claw			ROTAL	FOC	TAGE CORING O	7 1 11 1	TOTAL	70 ft	
T		RILLING AGENCY: U.S.G.S.	4 0108		DRILL TY		adril1 524		DEPTH TO	.48 ft	
f		THOLOGY RECORDED BY Fivas				AL LOGS REC		Centur	y Geophysica		
		MARKS: Density log scale chan	ged from	n 25 to							
		Lost circulation @ 557	ft								
F					GAMMA	1	0	ENSIT	·Y	DE	PTH
		LITHOLOGY	8 D 0 C			E <u>250</u> CPS			25 & 50 KCPS	1.	SE .
			STR		IG SPEED D DEPTH	<u>20</u> FT/MIN 644	LOGGING SF LOGGED DE		20FT/MIN	FEET	METERS
				LUGGE			LOUGED DE	-		0	
4					*		~	5 			
4		Sandy siltstone with possible coals at 27-30 ft and 35-37 ft, weathered			\$			***		_	
1		to 20 ft			=	>		5		_	-10
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-\6	50				Server Server			季		30	
+								4		-	-20
1		Sandstone, greenish-gray			Ę			Ş		-	
]					* ***********************************			}		100-	-30
4,	116	Siltstone			Sang Indra Mill from his word some and a some and an analysis of the sound of the s			}	,	_	
	122	GILISTONE			2			} Ş	!	_	
]		Sandstone			}			*		1	40
4		Salas conc			\$				· ===	150-	
- 1	160	Silty sandstone			}			فحرمج		-	-50
	L74 L76	Siderite concretions	77777		}			مح	>	-	
		Silty sandstone Siderite concretions			}			}_	,		
-1		Carb shale, black to brown						5	3	200-	-60
+	.00	Sandstone, siltstone			}				<	-	
],	228	alactic, sittistule			3				\(\)	_	-70
4	0				}				}	-	
4		Sandstone			}			<	}	250 —	
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		Siltstone Sandstone			*		ļ		}	_	
- 2	289	Siltstone			\(\)				5	 	-90
-	307	SILCSCORE			5				3	300-	~
]		Coal, black			E					-	
]3	328	Sandy siltstone									-100
┤,	z /1 [Sandy siltstone			5				\{\bar{\}}	-	
4	045	Sandstone	:::::::		₹ 85				\$	350-	J

LITHOLOGY		GAMMA	DENSITY	DEPTH	
	STR 1P LOG	T. C. 2 SEC. RANGE <u>250</u> CPS	T. C. <u>1</u> SEC. RANGE <u>25&50</u> KCPS	- S	S
	IS 1	LOGGING SPEED 20 FT/MIN	LOGGING SPEED 20 FT/MIN	FEET	METERS
		LOGGED DEPTH 644	LOGGED DEPTH 644	<u> </u>	_
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Sandy, siltstone		>	3	1	110
Sandy, \$11tstone		محج	3		
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395 Sandstone 412	*******	ک ے	5	400-	20
		\(\frac{1}{2}\)	}	-	
Sandy, siltstone		3	{	-	
		همجر	. 5	- -13	30
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Sandy siltstone		\rightarrow	کے	[]"	40
86 Cool block		* ***	8727		
86 Coal, black 190		\geq			50
Coal and carbonaceous shale		Many My Man Man Man Man Man Man Man Man Man Man	~~~	500-	,
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		}		330-7 -17	70
Coal, black					
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